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May, 2005

A Network Effects Perspective on Software Piracy

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I Introduction

The software industry devotes considerable efforts to combat software piracy. The industry's trade organizations, such as the Software and Information Industry Association (SIIA) and the Business Software Alliance (BSA), fight unauthorized use of copyright not only in the courts but also through extensive lobbying in the legislative and executive branches of government and by influencing public opinion through media campaigns. Even religious leaders have been harnessed to contribute to these efforts and issued religious edicts banning software piracy.¹ The main obvious and rather intuitive complaint of the software industry is that software piracy is a source of huge losses to the industry.² These efforts on behalf of the industry, as well as similar efforts on behalf of sectors of the information industries, have yielded significant achievements in the form of new international treaties, such as the TRIPS Agreement³ and the

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† I am grateful to David Tadmor, Jon Putnam, Michael Trebilcock, Ed Iacobucci, Doug Lichtman, Wendy Gordon, Amitai Aviram, Ittai Paldor, and participants at the 2003 Annual Meeting of the American Law and Economics Association and the 2002 Annual Meeting of the Canadian Law and Economics Association for their ideas, insights, comments, and suggestions. All errors are mine.

1 See, e.g., Susan Postlewaite, 'A Fatwa on Piracy' *IP Worldwide* (31 May 2002), online: Law.com <<http://www.law.com/servlet/ContentServer?pagename=OpenMarket/Xcelerate/View&c=LawArticle&cid=1022788124526&t=LawArticle>> (reporting an Islamic *fatwa* against piracy issued in February 2002 by Sheikh Ibrahim Atta Allah of Al Azhar in Cairo, the highest religious authority in Sunni Islam); see also 'Scholar's Fatwa Says Piracy Not Islamic,' *Islam Online* (1 March 2001), online: Islam Online.net <<http://www.islam-online.net/english/News/2001-03/02/article10.shtml>> (a report on a similar fatwa issued by Saudi Arabia's top Islamic cleric); and a press release issued by the Israeli branch of the BSA on 13 September 1999 announcing a similar edict issued by major Israeli orthodox rabbis: Business Software Alliance, Press release (13 September 1999), online: BSA Israel <<http://www.bsa.org.il/press/index.html>> (in Hebrew).

2 See Business Software Alliance, 'Eighth Annual BSA Global Software Piracy Study: Trends In Software Piracy 1994–2002' (2003), online: Business Software Alliance <http://global.bsa.org/globalstudy/2003_GSPS.pdf> [BSA Report] (estimating that global losses from software piracy in 2002 were US\$13.08 billion).

3 *Agreement on Trade-Related Aspects of Intellectual Property Rights*, Annex 1C to the *Marrakesh Agreement Establishing the World Trade Organization*, 15 April 1994, 33 I.L.M. 81 [TRIPS Agreement or TRIPS].

WIPO Copyright Treaty;⁴ new legislation at the national level (such as the Digital Millennium Copyright Act in the United States);⁵ and increased government spending on enhanced public enforcement of copyright laws.⁶ Surprisingly, and in sharp contrast to the industry's vociferous complaints about it, the use of technology to combat software piracy is limited, and many popular software products are distributed without any means of protection, rendering their unauthorized copying and distribution quite an easy task.

This lack of protection is puzzling. Software piracy is often analogized to theft. A BSA brochure, for example, opens with the following statement: 'Most people would never consider stealing something that did not belong to them. But those who copy software without authorization are, in fact, stealing someone else's property – their intellectual property.'⁷ But if one follows the analogy, the corresponding statement is also correct: most property owners would never consider leaving their property unprotected unless they do not particularly mind if it is stolen. So when a person chooses not to adopt any technically available protective measures with regard to his property, and confines his protection efforts exclusively to heavy spending on lobbying and legal proceedings, something seems odd; something does not fit with our everyday life experience. If an individual leaves his valuable new car on the street with the keys in the ignition and the car is stolen, it is likely that nobody will pay serious attention to his complaint, even if there is no doubt that his property rights were violated. If a group of people who wish to live in an urban community where members do not have to lock their homes were to lobby the government to spend more resources on policing their neighbourhood, their demand would likely be seriously questioned.

Why, then, do many software publishers choose not to protect their software and enable *de facto* free use, while at the same time complaining so much about that free use? The conventional answer is that software protection is technically and commercially impractical. This article advocates an alternative explanation: that the failure to protect software is a conscious business profit-maximizing strategy. This strategy is based on three elements. The first element is cross-sectional price discrimination, in which the lower tier of customers 'purchases' illegal versions for a zero price. In the face of network effects that exist in many software

4 World Intellectual Property Organization Copyright Treaty, 20 December 1996, 35 I.L.M. 65.

5 Digital Millennium Copyright Act, 17 U.S.C. §§ 1201–1205 (1998) [DMCA].

6 See, e.g., Attorney General Janet Reno, 'Protecting Intellectual Property in the Digital Age,' Symposium of the Americas (September 2000), online: <<http://www.usdoj.gov/archive/ag/speeches/2000/91200agintellectualprop.htm>> (describing new initiatives in the federal enforcement of intellectual property laws).

7 Business Software Alliance, 'Software Piracy and the Law' (2001), online: Business Software Alliance <<http://www.bsa.org/resources/2001-05-23.57.pdf>>.

markets, such a strategy achieves the most expeditious and widest dissemination of software, maximizes the value of the network, and may also accelerate a tipping of the market in favour of the more dominant publisher. As a result, publishers are able to increase their profits compared to those earned in a smaller and less valuable network. The second element is dynamic pricing in a multiple-period setting. At a second stage, due to a lock-in phenomenon, higher than market prices can be charged to potential ex-pirates who face a threat of litigation and wish to legitimize their software. The third element is the use of piracy as a means to maintain an incumbent's monopoly position by creating higher barriers to entry, in a manner equivalent to strategic or predatory pricing.

The article will first explore and reject the conventional explanations for the failure to protect software. It will next turn to establishing the alternative theory and will end with a partial exploration of some legal and policy implication that the theory may, or should, entail. Several economists have already analysed the potential influence of piracy on publishers' profits in the context of network markets through the creation of a large (and pre-emptive) installed base,⁸ yet they have not addressed the question of why publishers might prefer tolerating piracy over adopting explicit methods of price discrimination. An answer to this question is the main contribution of this article, as well as its analysis of the increased opportunity to hold up customers that piracy creates and the analysis of the potential implications for legal policy.

II *Is software protectable?*

The basic assumption of this article is the existence of a dissonance between the software industry's loud complaints about significant losses from piracy, on the one hand, and the prevalent failures to technically protect software from unauthorized copying, on the other. Naturally, such a dissonance exists only if there are reasonable means for software protection; otherwise there is no dissonance at all. People are expected not to leave their cars open with the keys in the ignition; they are not expected to prevent the theft of their car by a thief with a forklift. So a necessary step before suggesting theories that explain this dissonance will be to establish whether software is technically protectable. The article's perspective, however, is not technological. I will not purport to opine on the technical question of the availability of protection technologies. Instead I will survey the several explanations that have been offered for the apparent lack of protection and will cast some serious doubts on their persuasiveness. Consequently, I will not *prove* that protection is available but lay some foundations to establish a reasonable assumption that it is.

⁸ See Part III.B.1, below.

A THE LEGACY OF THE 1980S

Are there technological means for software protection? The current lack of software protection is often attributed to the software industry's experience with protection in the 1980s – the early years of the personal computer (PC). In those days many software publishers used protection technologies to protect their software from being copied without their authorization. One popular method of protection was 'key disks' that the user needed to use in order to run the software.⁹ Other protection technologies were 'access locks' – a code required to enable the software – and 'dongles' – pieces of hardware connected to the serial or parallel port of the computer that contained the key for the operation of the software.¹⁰ By the end of the decade, however, all of these methods were abandoned, and most publishers began selling their software free of any protection technology.¹¹ Three explanations are generally offered for the abandonment of software protection. The first is that protection appeared to be futile; software companies learned that every copy protection scheme, no matter how sophisticated, was eventually 'cracked' (or defeated) by an equally clever hacker.¹² One commentator quotes estimates of analysts' opinions according to which the lifetime of any protection scheme was three to four months.¹³ A related argument is that protection is useless because it will only enhance the efforts to circumvent it: 'the more security you hide your goods behind, the more likely you are to turn your sanctuary into a target.'¹⁴

A second explanation is that protection methods annoyed legitimate users by interfering with necessary computer functions, such as hard drive installation or data backup.¹⁵ Another problem related to protection key disks was that if the key disk became lost or damaged, software owners had to wait for the manufacturer to send a replacement.¹⁶ Dongles, too, caused operational difficulties, such as the need to install a separate dongle for each different piece of software installed on the same computer.

9 Kory D. Christensen, 'Fighting Software Piracy in Cyberspace: Legal and Technological Solutions' (1997) 28 *Law & Pol.Int.Bus.* 435 at 446 ['Fighting Software Piracy'].

10 Vicky Gerl Neumeyer, 'Software Copyright Law: The Enforceability Sham' (1989) 35 *Loy.L.Rev.* 485 at 495–6.

11 David M. Hornik, 'Combating Software Piracy: The Softlifting Problem' (1994) 7 *Harv.J.L.&Tech.* 377 at 414 ['Combating Software Piracy'].

12 Christensen, 'Fighting Software Piracy,' supra note 9 at 467.

13 *Ibid.*

14 John Perry Barlow, 'The Economy of Ideas' *Wired Magazine* 2.03 (March 1994) 85, online: [Wired Magazine <http://www.wired.com/wired/archive/2.03/economy.ideas.html>](http://www.wired.com/wired/archive/2.03/economy.ideas.html).

15 Hornik, 'Combating Software Piracy,' supra note 11 at 414.

16 Christensen, 'Fighting Software Piracy,' supra note 9 at 467.

A third explanation is that users simply did not like the protection and that markets eventually drove out protection as companies marketing only copy-protected software found themselves losing out in the marketplace to those firms willing to risk distribution of unprotected programs.¹⁷ In a recent public lecture, the deputy general counsel of Microsoft described the software industry's experience with protection and summarized these arguments:

The software industry had an interesting experience in the 1980's, because at that time, when the personal computers first became popular, most software came with copy protection. You bought a floppy disk and that disk had protection that enabled you to make only two copies of the program. And this was true if you bought the software from Microsoft or the other popular companies of the time: Lotus, WordPerfect, anybody else. By the late 1980's every single company abandoned that approach for the simple reason that legitimate customers did not like it. They found that there were times when they needed to make additional copies: they sold the computer and bought a new one and wanted to move their software, or their hard disks crashed and they needed to reinstall it. And even though at the time worldwide piracy rates for software were in excess of 80% the need to take care of the legitimate 20% of the market place took precedence over trying to deal with the rest. And that same bias very much exists today, I see it all the time when these issues are debated inside Microsoft. In addition to thinking about customer acceptability, there are new considerations that really weren't of equal importance in the 1980's: concerns about privacy – privacy is so important to consumers, that no company can be successful with a product today unless it takes account of it. Things need to be operationally feasible, I've seen many academic articles that have conjured up these incredibly elaborate copy protection systems, where – you know – each time you open the work and read a new page you're going to have to pay another penny. Even if consumers would accept that, which they won't, even if privacy advocates would accept that, which they won't, the operational complexity involved in building such a system, I would argue, would simply render it infeasible. And finally one needs to take to account of the fact that anything that you can protect through technology can be broken through other technology.¹⁸

17 Pamela Samuelson, 'Will the Copyright Office Be Obsolete in the Twenty-First Century?' (1994) 13 *Cardozo Arts & Ent.L.J.* 55 at 59.

18 Bradford L. Smith, 'After the Euphoria: Public Policy for the Internet' (Inaugural Osler, Hoskin & Harcourt Lecture in Law & Technology, Centre for Innovation Law and Policy, University of Toronto, 30 October 2001), online: <<http://media.snow.utoronto.ca:8080/ramgen/extra3/Laws/CILP10-30.rm>> (video streaming) ['After the Euphoria'].

B THE EXPERIENCE OF THE PAST AND TODAY'S REALITY

The explanations described above, without prejudice to their historical value, have little explanatory value for today's reality. They may explain why the protection devices of the 1980s disappeared; but they do not convincingly explain why relatively few different protection schemes have been introduced since that time.

1 *The 'old habits' argument*

Some of the commentators referred to above suggest that the bad experiences of the past discourage software providers today from introducing new protections – a kind of 'old habits die hard' argument.¹⁹ Although this argument is appealing, reality casts serious doubts on it. There is no more dynamic industry than the software industry, and it is difficult to believe that today's managers are so much captured by the experiences of their predecessors.

This scepticism is increased when one considers the stakes involved. If we take the industry's figures seriously, losses from unauthorized use are US\$13.08 billion a year. This implies that the industry would theoretically be willing to spend up to that amount on preventing such use if effective technology was available or could be developed cost-effectively. It sounds like a very lucrative business opportunity for potential entrepreneurs.²⁰ Even if the lifetime of any protection scheme does not exceed three or four months,²¹ adequate technology would still potentially save many millions of dollars. The fact that a potential demand of such magnitude is consistently unmet by corresponding supply suggests that, *de facto*, the demand is much smaller. In other words, the software industry's unwillingness to implement copy protection is the cause of the lack of technology protection.

2 *The futility of protection argument*

The second argument is that it is not worthwhile for a software publisher to apply protection because any protection technology will be rapidly circumvented. This argument has several flaws. Despite the ease of copying unprotected software, piracy is not without cost. The cost of piracy depends on several factors. First of all, there are costs of obtaining the illegal copy. Although I assume that I can probably obtain an illegal copy of any software that I wish, I still need to search for it and in some

19 See Christensen, 'Fighting Software Piracy,' *supra* note 9 at 466.

20 To compare: the sum of US\$13 billion amounts to almost half of Microsoft's 2002 annual revenue (US\$28.4 billion) and far exceeds Microsoft's 2002 net income (US\$7.8 billion). See Microsoft Corp., *2002 Annual Report* (2002), online: Microsoft <<http://www.microsoft.com/msft/ar.msp>>.

21 See note 13 *supra*.

cases will need to pay for it.²² The cost of piracy also includes the expected value of penalties or lost reputation if caught, as well as the individual cost one ascribes to violating the law generally or violating software publishers' rights specifically.²³ Furthermore, since supplying unauthorized copies is illegal, there is a limit on the size of this activity: the more people are engaged in that illegal activity, the more likely they are to get caught.²⁴ Additional costs are those of blank disks or other copying devices; those of photocopying or buying documents that are otherwise supplied with legitimate copies; and the opportunity costs of forgone performance guarantees, support services, trade-in or upgrading rights, and so on that legitimate software buyers often receive.²⁵ When technology protection is employed, piracy bears an additional cost – the cost of breaking or circumventing that technology.²⁶ A potential user's decision to buy, to pirate, or not to use the software at all is a function of the following variables: the value that the user gains from the software, the price of buying a legitimate copy, and the cost of pirating. Technological protections do not necessarily eliminate all potential piracy, but they nevertheless increase its cost and consequently narrow its extent. The analogy to tangible property may be useful again. While it is probably true that any lock can be broken and any sophisticated surveillance and protection system can be circumvented, it is also true that valuable property protected by some technology – even if that technology is not 100 per cent break-proof – is less likely to be stolen than the same valuable property without any protection at all.

The discussion to this point may have conveyed the impression that software protection does not exist any more. This is not correct. Indeed, many popular software applications are not protected; the most notable examples are MS Windows and MS Office,²⁷ and, of course, many applica-

22 Free meals are rare even in markets for pirated goods. Pirated software is seldom entirely free. In the case where it is sold by pirate distributors, there is an actual monetary payment, and even when a copy is offered by a friend 'for free,' he may expect to receive something in return.

23 Kathleen Reavis Conner & Richard P. Rumelt, 'Software Piracy: An Analysis of Protection Strategies' (1991) 37 *Manage.Sci.* 125 at 127 ['Software Piracy'].

24 Carl Shapiro & Hal R. Varian, *Information Rules: A Strategic Guide to the Network Economy* (Boston: Harvard Business School Press, 1999) at 93 [*Information Rules*].

25 Conner & Rumelt, 'Software Piracy,' supra note 23.

26 Ibid. Recent legislation such as the DMCA in the United States increases the cost of piracy, since it outlaws not only the act of making unauthorized copies but also the act of circumventing measures that control access to protected work. Although such acts were probably illegal even under pre-DMCA law – see Pamela Samuelson, 'Intellectual Property and the Digital Economy: Why the Anti-Circumvention Regulation Needs to Be Revised' (1999) 14 *Berkeley Tech.L.J.* 519 at 521 – the DMCA nevertheless made the prohibition explicit, therefore less expensive to enforce and more costly to violate.

27 See also Christensen, 'Fighting Software Piracy,' supra note 9 at 468 n. 219.

tions can be downloaded freely (and legally) from the Internet. But the abundance of free or unprotected applications should not mislead us into concluding that protection, even if not perfect, is impossible. Advancements in the science of cryptology may provide good solutions for software protection,²⁸ and such solutions do exist.²⁹

A closer and non-exhaustive look at the software industry reveals that some software providers do protect their software. Just to name a few examples: the software embedded in DVDs and video games is protected; many professional databases (such as Westlaw or Lexis) are protected, and access is limited to subscribers only; online banking and other forms of e-commerce are based on protected software technologies; many shareware applications, which are distributed free over the Internet for a trial period, are protected. Some of them are disabled when the trial period is over, while others prompt annoying messages that encourage users to purchase the software or upgrades for it and disappear only if the software is indeed purchased. These examples suggest that there is no inherent obstacle to efficiently protecting software – at least to some degree – and that the decision whether to protect or not is a business decision, not a matter of technological impediment. There is no reason to assume, for example, that instead of, or in addition to, the notorious animated Office Helper, Microsoft could not have introduced an animated MS Office Lawyer with a message such as, ‘Hello, I’m Microsoft’s animated lawyer. You are currently using an illegal copy of Office and infringing my client’s copyright. If you want to get rid of me you may contact any Microsoft distributor, purchase a licence and I’ll be gone forever. If you don’t I’ll sue you.’ It would certainly not eliminate all piracy, but it might eliminate some of it.

3 The annoyance argument

The third argument invoking the chilling heritage of the past is that past protection methods annoyed customers until they were eventually abandoned. This argument points at two types of annoyance, which I will call ‘technical annoyance’ and ‘annoyance in principle.’ ‘Technical annoyance’ refers to the operational difficulties and defects that caused trouble to users. This argument is not convincing when used to explain today’s failure to adopt protection schemes. The technology of the computer industry has developed so rapidly since the late 1980s that claiming that software companies do not apply protections today because ‘copy disks’ caused operational problems in the 1980s is like saying that one should not expect high-speed, high-quality laser printers to be developed

²⁸ Ibid. at 467–8.

²⁹ See Howard C. Anawalt, ‘Using Digital Locks in Invention Development’ (1999) 15 Santa Clara Comp. & High Tech.L.J. 363 at 366–7, 376–7.

because of problems with paper being misfed in old dot-matrix printers in the 1980s. If software providers were really interested in more user-friendly protection technologies, presumably such technologies would have been developed.

‘Annoyance in principle’ refers to the notion that any protection would be rejected *per se* by consumers who simply dislike the idea of being restricted. Because of that dislike, goes the argument, software providers who offered protection-free software gained competitive advantage over protecting providers, and eventually protection was driven out of the market. This argument is curious. It is very easy to understand why users do not like to be restricted in their uses: if you can pay less and receive more, you are likely better off than if you were paying more and receiving less. It is obvious that users would value software that they can install on all their PCs and share with their friends more than they would value restricted software.³⁰ But this observation – which focuses on the demand side only – does not really explain the failure to protect software when the lack of protection causes significant losses to the software publishers – as they repeatedly allege. The following analogy demonstrates this. It is easy to assume that consumers would prefer supermarkets in which they could take as many products as they like and pay for only one product – or, even better, not pay at all. But it is more difficult to assume that retailers would find this business strategy very appealing. The result is an equilibrium in which consumers have to suffer some ‘annoyance’ – they have to pay for what they consume, wait in line at cash registers, be embarrassed when their merchandise accidentally triggers the alarm system, and so on. Competition between retailers may minimize such consumer annoyance by causing them to adopt improved technologies, decrease queues, and improve service, but it will not cause retailers to forgo all consumer annoyance and make payment voluntary.

It is obvious that when protection is applied it should be assumed that in some cases it will be circumvented, yet the losses from the resulting piracy may not justify the cost of applying more costly technologies. Piracy of this kind is an ‘economic friction’ – like shoplifting for retailers, burglary for homeowners, and perhaps the distribution of decoded DVDs.

30 This is not necessarily true for large organizational users, which are more vulnerable to infringement proceedings. Such organizations may voluntarily employ internal copyright monitoring programs and may even prefer protected software that can avoid, or at least limit, their legal exposure.

If software publishers could effectively discriminate between sharing and non-sharing users, they could be paid *de facto* for pirated copies by charging sharing users more than they charge non-sharing users, in the same way that academic journal publishers can appropriate some of the value of photocopying their articles by charging libraries higher subscription fees. See Stan L. Liebowitz, ‘Copyright Law, Photocopying and Price Discrimination’ (1986) 8 Res.Law & Econ. 181.

But the magnitude of worldwide software piracy and the apparent lack of any applied protections suggest that software piracy is a different phenomenon. One estimate of the losses from shoplifting is that they amount to 0.8 per cent of retail sales,³¹ yet many retailers try to minimize and control it by using various technologies such as closed-circuit television or electronic tags. It is difficult to imagine that retailers would continue to use their existing protection technologies and selling techniques if the rate of shoplifting was similar to the rate of software piracy. The BSA estimates that the worldwide piracy rate in 2001 was 40 per cent;³² protection was abandoned when piracy levels were reaching the 80 per cent.³³ It is difficult to imagine any retailer tolerating and surviving such high rates of shoplifting; yet the software industry, despite its obvious complaints, seems to thrive. This suggests that the phenomenon of software piracy is not only quantitatively different from shoplifting but also qualitatively different from it, and from other types of theft, and that its existence is not a mere type of 'economic friction.' This qualitative difference is the source of the inquiry into another explanation for software piracy that will be described in the next part of the article.

III *Network effects and profitable piracy*

A NETWORK ECONOMIES

Many information goods and technologies can be viewed as networks.³⁴ In a pure network, the single component – standing alone – has little or no value. A classic example is a fax machine. If I owned the one and only fax machine in the world (even the most sophisticated one), it would have no value, since I would not be able to send faxes or to receive any. When a second fax machine is introduced, and the two machines can communicate with each other, the machine starts to gain some value. As more people with fax machines join the network, the value of the fax machine grows, as I can communicate by fax with more and more people. This phenomenon, in which 'the utility that a user derives from consumption of a good increases with the number of other agents consuming the good,'³⁵ is often called 'network externalities' or 'network effects.'³⁶

31 Dena Cox, Anthony D. Cox, & George P. Moschis, 'When Consumer Behavior Goes Bad: An Investigation of Adolescent Shoplifting' (1990) 17 *J.Consumer Research* 149 at 149.

32 *BSA Report*, supra note 2.

33 See Smith, 'After the Euphoria,' supra note 18.

34 See Shapiro & Varian, *Information Rules*, supra note 24 at 183.

35 Michael L. Katz & Carl Shapiro, 'Network Externalities, Competition, and Compatibility' (1985) 75 *Am.Econ.Rev.* 421.

36 See Mark A. Lemley & David McGowan, 'Legal Implications of Network Economic Effects' (1998) 86 *Cal.L.Rev.* 479 ['Legal Implications'], for a thorough discussions of network theory and some legal implications of it.

A similar phenomenon exists in many software markets. When I obtain a copy of certain software, I join a network of users of that software. Unlike users of fax machines, however, software users need not necessarily be connected to each other, and a single user of software could derive significant benefits from the mere ability to run the application and perform the tasks that it provides.³⁷ Nevertheless, the software user is often likely to benefit from it even further if more people use it as well.³⁸ The more people use that software, the more valuable it becomes. Members of the software network can easily share files and more easily communicate with each other. Furthermore, as the number of the software users increases, other developers develop compatible applications and complementary products and services.³⁹ If the user encounters a technical problem, he will more easily find an expert who will solve the problem as the number of users increases; if the same software is used in both domestic and work environments, the skills of mastering the software can be costlessly transferred between the two, to the mutual benefit of employers and employees.⁴⁰ When an individual purchases a software program, the retail price is only a small fragment of the actual costs she must bear. The costs of learning and customizing the software are significant, and the buyer faces the risk that this human capital will not be transferable to other situations or work environments.⁴¹ By using the same software as everybody else, the buyer can minimize this risk. The result is that a particular software network becomes increasingly valuable and attractive as its user base grows, while competing networks may become less valuable and less attractive. In such circumstances, other things being equal, more and more consumers are likely to choose the bigger network. This phenomenon is sometimes referred to as ‘positive feedback.’⁴² If a market is characterized by positive network externalities that are large enough to ignite substantial positive feedback, the market may tip in favour of one player.⁴³ In the most extreme cases, positive feedback can lead to a winner-take-all market in which a single firm or technology dominates the market, that is, ‘monopolizes’ it.⁴⁴

37 An obvious exception is software designed for communication between people. E-mail networks, for example, resemble telephone or fax networks.

38 The first type of network is often called ‘actual network’ and often characterizes communication networks, while this type of network is often called ‘virtual network.’ See Lemley & McGowan, ‘Legal Implications,’ supra note 37 at 488–94.

39 See *United States v. Microsoft*, 84 F.Supp. 2d 9 at 20 (1999) (‘Microsoft Case’ – Findings of Fact), specific point aff’d, 253 F.3d 34 at 55 (2001) [*Microsoft*].

40 Joshua Slive & Dan Bernhardt, ‘Pirated for Profit’ (1998) 31 Can.J.Econ. 886 at 888.

41 Conner & Rumelt, ‘Software Piracy,’ supra note 23 at 126.

42 Shapiro & Varian, *Information Rules*, supra note 24 at 173–9.

43 *Ibid.* at 176; see also Stanley M. Besen & Joseph Farrell, ‘Choosing How to Compete: Strategies and Tactics in Standardization’ (1994) 8 J.Econ.Perspectives 117 at 118.

44 Shapiro & Varian, *Information Rules*, supra note 24 at 177.

This, of course, is a most desirable result for the one who takes it all, and a tragic one for the loser. It is therefore reasonable to expect would-be winners to endeavour to become the actual winners. If successful, they are likely to celebrate their victory with significant monopoly rents. If a winner-take-all scenario is expected, each competitor has no choice but to try to win the race. The same incentives nonetheless exist even if the market will not necessarily result in a winner-take-all scenario. The existence of network effects implies that even if two or more software networks of similar merit can coexist, the bigger network is likely to be more valuable to users, and hence likely to generate higher profits to its publisher. Even if the situation is not a battle for life or death, rational software publishers facing network effects will recognize the benefits of creating bigger networks and strive to expand their user base in an attempt to become the dominant network.

Obviously, the best way to create the largest user base is by giving software for free to every potential user. But this may not be a viable business strategy for a profit-maximizing firm, because giving software for free means that the publisher forgoes revenue from customers who are willing to pay. The ideal method is to gauge the individual demand of every customer and charge her according to her reservation price.⁴⁵ Unfortunately, because the information requirements for a seller wishing to price his product in such a manner are very demanding, this form of pricing is not very plausible.⁴⁶ Alternatively, if the software publisher is capable of imperfectly discriminating among different users so as to cause users with high value to pay more and users with low value to pay less, she can maximize the size and value of her software network, and maximize her profits, by applying second- and third-degree price discrimination in various modes. One method is 'versioning' – offering different versions of the software, such as 'home' and 'pro,' at different prices and letting users choose according to how much they value each version.⁴⁷ For example, Adobe allows its Acrobat Reader to be legally downloaded for free, but the Reader can only be used to view and print files created in PDF format. Those users who need to *create* PDF files must purchase some other version of the Adobe Acrobat family. Another method is to sell identical software to different classes of users and charge them different prices – for example, offering discounts to students.⁴⁸ An additional method is to discriminate over time – offering low introductory prices at the beginning and higher prices later as the software

45 Economists call this 'first-degree' (or 'perfect') price discrimination.

46 Jeffrey Church & Roger Ware, *Industrial Organization: A Strategic Approach* (Boston: Irwin, McGraw-Hill, 2000) at 164.

47 This is what economists call 'second-degree price discrimination.'

48 This type is often termed 'third-degree price discrimination.'

becomes more valuable. In practice, publishers can adopt any or all of these methods, as well as others. For example, in 2001 Microsoft released its new operating system, Windows XP, in two versions: a home version and a professional version. The professional version contains more features than the home version, and its retail price is higher. At the same time, it is licensed to some users – university staff, for example – for a price lower than the ordinary retail price of the home edition.

B THE ROLE OF PIRACY IN SOFTWARE MARKETS WITH NETWORK EFFECTS

1 Increasing network value and achieving monopoly

Understanding how network effects affect software markets provides a refreshing perspective on software piracy. If it is possible to protect software and reduce the rate of piracy, a software publisher's decision not to protect his software is equivalent to a decision to price discriminate and let non-paying users copy the software for free. By doing so, the publisher may achieve the greatest network effects in the shortest time and thus win the race to become the monopoly. Creating a bigger network results in a higher value for the network and can have a positive effect on the publisher's profits.

The profitability of a strategy of allowing limited software piracy in network markets has been described and modelled by several economists. Kathleen Reavis Conner and Richard Rumelt⁴⁹ have developed a model for an optimal protection strategy for a monopolist software publisher. They observe that software piracy has two economic effects on software publishers: it leads to a fall in direct sales, but, by increasing the size of the installed base, it may also boost the demand for the particular software. In the simplest setting, increased protection raises both price and profits. However, when network externalities are present, increased protection may result in lower profits, even when substantial piracy exists. Conner and Rumelt show that when the network externality is strong and protection acts chiefly to push pirates out of the user base rather than to move them into the buying camp, a policy of no protection might be optimal.⁵⁰

Lisa Takeyama⁵¹ reaches similar conclusions with regard to the profitability of piracy and also explores the welfare effects of piracy when network externalities are present. She notes that unauthorized copying effectively allows the software publisher to price discriminate among

49 See Conner & Rumelt, 'Software Piracy,' supra note 23.

50 Ibid. at 136–7.

51 Lisa N. Takeyama, 'The Welfare Implications of Unauthorized Reproduction of Intellectual Property in the Presence of Demand Network Externalities' (1994) 42 J.Industrial Econ. 155.

different classes of consumers. Such unauthorized copying efficiently increases the network size, and this increase allows the publisher to charge buying customers a price that appropriates the externality of the increased network size. Takeyama also suggests that the expanded output achieved by unauthorized copying can be exploited by the software monopolist to create a pre-emptive installed base.⁵² According to her model, when network effects are present, not only can unauthorized copying lead to greater profits for the software publisher, it can also produce a Pareto improvement in social welfare.⁵³

Moshe Givon, Vijay Mahajan, and Eitan Muller analyse the effects of software piracy on the legal diffusion of software.⁵⁴ Their conclusions and empirical results corroborate the analytical results of Conner and Rumelt. They argue that for certain types of software, where word-of-mouth interaction among users and potential users is critical to the growth of the user base over time, pirates play an important role in converting potential users into users of the software, many of whom will legally purchase the software. Piracy thus plays a dominant role in the generation of buyers over the software's life cycle.⁵⁵ In their empirical study of the diffusion of spreadsheet and word-processor software in the United Kingdom, Givon *et al.* found that from the late 1980s through the early 1990s, of every seven software users, six had pirated copies. On the other hand, the pirates significantly influenced potential users to adopt this software and, in fact, contributed to generating more than 80 per cent of the unit sales for these two types of software.⁵⁶ With regard to the issue of protection devices, the authors suggest that, given the very sizeable impact of pirates on legal buyers, a software publisher will find it best to take advantage of the positive influence of pirates on buyers and to delay the introduction of such devices.⁵⁷ They also support Takeyama's suggestion that a sizeable user base, legal and pirate alike, might act as an entry barrier for any potential competitor, which might then delay or even cancel the introduction of its new product.⁵⁸ The profitability of software piracy in the face of strong network externalities is similarly identified by Joshua Slive and Dan Bernhardt,⁵⁹ who analyse tolerated piracy as a type of price discrimination.⁶⁰ They also note the possibility of

52 *Ibid.* at 156.

53 *Ibid.* at 165.

54 Moshe Givon, Vijay Mahajan, & Eitan Muller, 'Software Piracy: Estimation of Lost Sales and the Impact on Software Diffusion' (1995) 50 *J. Marketing* 29 ['Software Piracy'].

55 *Ibid.* at 30.

56 *Ibid.* at 35.

57 *Ibid.* at 36.

58 *Ibid.*

59 See Slive & Bernhardt, 'Pirated for Profit,' *supra* note 40.

60 *Ibid.* at 889.

a two-stage strategy with regard to piracy: tolerating it during the first stage in order to build a large user base and thus increase the value of the product, followed by increased anti-piracy spending as the product becomes more successful.⁶¹ Slive and Bernhardt contend that almost all anti-piracy spending is done by well-established companies, suggesting that new entrants have more to gain, or at least less to lose, from piracy.⁶²

Stephen King and Ryan Lampe⁶³ go one step further in analysing the conditions under which network externalities might make piracy a profitable option for a software publisher. They show that piracy can be profitable only if some users have a greater ability to pirate than others, that the publisher cannot price discriminate explicitly, that the ability to pirate is inversely related to the willingness to pay, and that the number of potential pirates is relatively small compared to the number of paying users.⁶⁴

Oz Shy and Jacques-François Thisse⁶⁵ analyse software protection policies for a price-setting duopoly software industry selling differentiated software packages when network effects are present. They demonstrate that increasing network effects make software more attractive to consumers, thereby enabling firms to raise prices. However, network effects also generate a competitive effect resulting from fiercer competition for market shares. Shy and Thisse show that when network effects are strong, non-protection is equilibrium for a non-cooperative industry.

2 Piracy as a form of price discrimination

By adopting a strategy of tolerating piracy, the software publisher may be seen as employing third-degree price discrimination: it offers the same product to customers with different preferences at different prices. Alternatively, the same strategy could be analysed as a form of second-degree price discrimination, in a manner that resembles the versioning

61 Ibid. at 897 (noting that Lotus became one of the stronger proponents of copy-protection technology and expanded significant resources on preventing piracy in the late 1980s, when it was already successful). One may wonder whether that was one of the causes of the decline of Lotus and its replacement by Microsoft Excel as the dominant spreadsheet software.

62 Ibid.

63 Stephen P. King & Ryan Lampe, 'Network Externalities, Price Discrimination and Profitable Piracy' (2003) 15 *Information Econ. & Pol'y* 271.

64 King and Lampe use a slightly different terminology than I will use later in this article. While I regard strategic tolerance of piracy as a form of price discrimination (a case in which the price is set at zero), even if implicit, they generally restrict the use of the term 'price discrimination' to cases in which *positive* different prices are charged. They also regard piracy and legal giveaways as equivalent and do not distinguish between the *explicit* nature of a giveaway and the *implicit* nature of tolerated piracy.

65 Oz Shy & Jacques-François Thisse, 'A Strategic Approach to Software Protection' (1999) 8 *J.Econ.Management Strategy* 163.

strategy described above. This time, instead of offering several versions that differ in their performance – a strategy that may result in a decrease in the value of the network and in the inducement of competition – the publisher offers the same high-quality product for all the users, but with different levels of legal or moral risk (and risk to reputation). The high-end version is the authorized high-price-no-risk product, while the lower-end version is the unauthorized low-price-high-risk product.⁶⁶

One important feature of this strategy is that many users cannot or will not opt for the high-risk product, either because they believe that it is morally wrong or because they cannot risk evading the law. Governments, for example, are rightly expected to respect the law, including intellectual property laws, in an orthodox manner. Large corporations, too, will probably be less inclined to opt for piracy because they may fear harm to their reputation if they are caught pirating. They may also realize that their size makes them a preferred target for enforcement, and their managers may be afraid of being held personally liable.

The complement to this strategy is anti-piracy campaigns, which are aimed at changing customers' preferences, by convincing them to choose the high-price-low-risk version rather than the zero-price-high-risk version. This is done by emphasizing the risks of infringement, by raising moral arguments against infringement, and by offering utilitarian benefits for compliance. There is a risk, of course, that if such campaigns are too successful some users with low reservation prices will not substitute legal copies for illegal ones and will be totally deterred from the market, resulting in a decrease in the size and value of the network. Perhaps this is one reason that enforcement actions are usually aimed at businesses rather than at individual users. Although litigation has fixed costs that make it relatively more costly to sue an individual, such suits can achieve a deterrent effect against other individual pirates if they are widely publicized. The fact that such suits are rare can be interpreted as a signal to individuals with low reservation prices that they can safely stay in the market.⁶⁷

66 Note, however, that in this type of price discrimination there is no perfect correlation between the value that a customer ascribes to the software and her willingness to purchase or pirate it. Presumably, some pirates opt for piracy even when the market price of it falls from their reservation price. Other pirates, however, whose reservation price is lower than the market price, would not purchase the software legally. This is, in fact, an attribute of any imperfect price discrimination scheme, whereby some customers with high valuation choose the cheaper product although they would have bought the more expensive product if it were the only one available.

67 Interestingly, the Recording Industry Association of America (RIAA) has recently started directing its legal efforts against individuals engaged in illegal file sharing. On 8 September 2003 the RIAA filed lawsuits against 261 individuals who had failed to prevent outsiders from gaining access to music files on their computers (Julie Hilden,

3 *Exploiting lock-in to increase revenue*

Information goods tend to entail high switching costs. Users tend to be locked in to their pre-chosen technologies.⁶⁸ This phenomenon is the basis for the second stage of the protection-free software strategy. Now, after the positive feedback has played its role and the race to monopoly is over, comes payday; now it is time for what the BSA calls ‘vigilant and vigorous pursuit of software pirates.’⁶⁹ This vigilant and vigorous pursuit usually means initiating enforcement actions against businesses that use unauthorized software. These enforcement activities are usually rapidly settled, inside or outside the courtroom.⁷⁰ The typical settlement involves legalizing past uses of the software and agreeing on licensing terms for future uses.⁷¹

There is a clear business rationale for this type of enforcement – for an *ex post* pursuit of infringers rather than the *ex ante* prevention of infringement through the application of software protection schemes. The rationale lies in the hold-up potential created by high switching costs. Unprotected software is bait. Once the bait is swallowed – once the user gets locked in – it is easier to charge the customer a higher price

‘Can the RIAA Truly Give Illegal Distributors “Amnesty”? And If So, Should They Accept?’ online: FindLaw’s Legal Commentary <<http://writ.news.findlaw.com/hilden/20030916.html>>. These legal efforts have recently been expanded, with the RIAA bringing infringement lawsuits against 744 individuals on a variety of peer-to-peer platforms. See RIAA press release (25 August 2004), online: RIAA Press Room <<http://www.riaa.com/news/newsletter/082504.asp>>. These lawsuits follow the RIAA’s announcement of July 2002 according to which it is considering filing infringement suits against individual users, thus departing from its policy of suing only for-profit piracy outfits and providers of peer-to-peer services such as Napster, Morpheus, or Kazaa: see Anna Wilde Mathews & Bruce Orwall, ‘Industry to Sue People Abetting Net Song Swaps’ *Wall Street Journal* (3 July 2002) B1. Because the main customers of home entertainment products are individual home users rather than businesses, and because the network externalities are probably smaller than in the case of business software, piracy in the entertainment industry probably does not generate higher profits: see Slive & Bernhardt, ‘Pirated for Profit,’ *supra* note 40 at 895. This may explain why the home entertainment industry is more active in exploring and adopting technological protective measures for CDs, DVDs, and computer games and why a move aimed at deterring individual users may make sense.

68 See Shapiro & Varian, *Information Rules*, *supra* note 24 at ch. 5.

69 *Business Software Alliance Software Management Guide 3*, online: Business Software Alliance <<http://www.bsa.org/usa/antipiracy/Resources-for-Business.cfm>> [*BSA Software Management Guide*]: ‘The software industry is vigilant and vigorous in its pursuit of software pirates, because they increase costs to users of legitimate, authorized software, and decrease the capital available to invest in research and development of new software.’

70 The typical action – when a business uses unlicensed copies of the software – is quite straightforward and does not involve complex factual or legal questions.

71 See a collection of press releases describing the results of enforcement activities by the BSA, online: Business Software Alliance <<http://www.bsa.org/usa/press/Education-and-Enforcement-Releases.cfm>>.

than could have been charged *ex ante*. If software is protected and cannot be used without paying for a licence, customers must pay greater attention to their initial choices. They are more likely to seriously consider alternative software solutions when they must pay before they join the network. Some of them may find that the benefits of joining a network, even the leading one, may not justify the price they are asked to pay. In other words, forcing customers to pay up front to join the network means greater competition between software publishers. Conversely, when the user is already locked in by his high switching costs, competition between networks is much less relevant. It is clear, then, that the price asked and paid *ex post* will reflect the hold-up situation and will be higher than the price that would have been asked and paid *ex ante*, when at least some level of competition was in place.

The case of governments (as of other big buyers) is a good demonstration of the way in which the combination of no protection and lock-in may increase software publishers' profits. Governments usually have strong purchasing power and often choose their suppliers through public tenders – in some cases they are even required by law to act in this way. Through the bidding process, governments can maximize their purchasing power and achieve prices that are closer to the competitive level. If software used by government employees were protected, governments would have no choice but to choose their software providers through public tenders. However, when software is not protected, and government employees can *de facto* choose their desired software, publishers can avoid the troubling process of competitive bidding. All they have to do is wait until the use of their software is so widespread that switching costs will render any subsequent competitive bidding redundant; even if legal requirements still require a formal public tender, economics will determine the winner in advance.⁷²

72 The following story, reported in Janet Lowe, *Bill Gates Speaks: Insights from the World's Greatest Entrepreneur* (New York: John Wiley, 1998) at 88, illustrates what I have described: In 1997, Bill Gates and Philippines President Fidel Ramos met and signed a pact to help the country develop a long-term information technology plan and create national Internet sites for education and government uses. In return, the Philippines pledged to protect Microsoft's intellectual property rights through laws and their enforcement, while the government would be able to buy newer software at half price. Following the signing of the pact, Microsoft gave the Philippines a certificate legalizing much of the government's pirated Microsoft software. The story describes Gates and Microsoft as benevolent: they are ready to sell their new software at 'half price' (compared to what?) and legalize old pirated software, all in return for a pledge to further protect Microsoft's intellectual property. A sceptical reader may suspect that after Microsoft's products became the standard within the Philippines administration, the government had no real choices but to further commit itself to Microsoft's products and that the 'half price' was not more than the reservation price Microsoft could have

Another benefit of *ex post* enforcement is that it enables the software publisher to price discriminate more efficiently and increase his surplus, since users are forced to reveal their true valuation of the software. According to copyright law, if a copyright has been infringed the infringer faces severe sanctions, both civil and criminal. The infringer may face the payment of damages, either actual or statutory, and may be enjoined from using the infringing copies. In some cases, he may be criminally liable.⁷³ Additionally, a clause common in many End User License Agreements (EULA) provides that the publisher may terminate the licence in the case of non-compliance with the terms and conditions of that licence.⁷⁴ Since a typical EULA determines the number of licensed installations, a licensed user who installs additional copies faces the possibility that the termination clause will be invoked, resulting in the necessity to re-license not only the infringing copies but his whole system.⁷⁵ When an infringing user credibly faces those threats, he has a clear incentive to reach a settlement with the publisher and will eventu-

charged the government of a developing country. Another example is an announcement by UK officials that they would consider dropping Microsoft as the main supplier of software to the civil service after Microsoft sought to increase its licence fees by 50 to 200 per cent. The threat was initially reported by the *Times*: see Angela Jameson, 'Whitehall Could Drop Microsoft' *The London Times* (4 November 2001), online: Times Online <www.timesonline.co.uk>. A few days later, the *Observer* published a sceptical article about the credibility of the threat. It described the UK public service as a 'Microsoft fiefdom' and noted that the threat had been no more than a futile attempt by the negotiating official to secure some concessions from Microsoft: see John Naughton, 'Being a UK Civil Servant Is All Part of the XPerience' *The Observer* (2 December 2001) 7.

73 See, e.g., 17 U.S.C. § 506(a).

74 The terms of many of Microsoft products' EULAs can be accessed from the Help menu of the application. Similar termination clauses are provided in practical guides. See, e.g., Robert Bond, *E-Licenses and Software Contracts: Law, Practice and Precedents* (London: Butterworths, 2000) at 140.

75 The severity of this threat is not clear, however. First, in order to terminate a licence on these grounds, the publisher would probably have to establish that the particular licensed copy whose licence is to be revoked was the one used in the installation of the infringing copies. Otherwise there would be no breach of the licence by the user, and its termination by the publisher might rather constitute a breach of contract. Second, a court might hold such a termination clause unenforceable on the grounds that it amounts to unreasonably large liquidated damages, especially if the ratio between the unlicensed copies and the licensed copies is disproportionate and an insignificant breach by the licensee would result in an extreme financial burden on the infringer. Third, it has been indicated to me by some practising lawyers that in cases of additional unlicensed installations by a licensed user, software publishers do not invoke the termination right and that non-contractual remedies based on copyright law are usually effective in inducing a settlement. This observation, however, does not preclude the possibility that such partially infringing users do consider the possibility of licence termination when they calculate their odds towards a settlement.

ally be willing to pay up to his reservation price.⁷⁶ In contrast, when the user and the software publisher negotiate *ex ante* (or do not negotiate at all, if copies of the software can be purchased directly as shelf products), the user's prospects of retaining a larger share of the consumer surplus are greater.

While every software publisher can hold up his locked-in customers, in a market with strong network effects the dominant software publisher's hold-up power is greater. When a customer who uses an unauthorized copy of the non-dominant software is being sued, his switching costs essentially comprise the cost of purchasing and assimilating the alternative software plus the loss of compatibility with the user's own old files.⁷⁷ That user, however, may gain from the transfer to the dominant software network because of its stronger positive externalities. Consequently, the net switching cost for the non-dominant software user is the cost of switching minus the gains from joining the dominant network. Conversely, there are no gains from transferring from the dominant to the non-dominant software, only an additional cost – that of forgoing the benefits of the bigger network. Network effects thus magnify the hold-up power of the dominant software publisher *vis-à-vis* his software users and decrease the relative hold-up power of the non-dominant publisher.

The description of pirated software as 'bait' implies departure from the assumption that all software users behave rationally. Such apparently irrational behaviour may nonetheless seem plausible. First, some rational users may recognize the danger in advance and yet rationally decide to pirate. Users may make this decision for several reasons: first, the user might estimate that the chances of being caught and sued are low; second, if the market has not yet determined which software is going to be dominant, the risk of being held up by the dominant supplier must be discounted by the chances that the pirated software will be the losing one; third, some users may be facing cash and credit constraints and may prefer to pay higher prices in the future, when cash is more abundant; and, fourth, in the case of other users the decision to pirate may be taken by a hired manager who prefers saving today, knowing that by the time the higher payment is due it will be another manager's problem.

In addition, it is not uncommon in real life that people swallow baits, and the bait of piracy is no exception. Of course, if they participate in a repeated game, they may learn their lesson and avoid the bait in subse-

76 If the only threat was an injunction against the use of the unlicensed copies, the upper limit of a settlement would be the retail price of those copies. But the infringer cannot get away by simply purchasing legal copies once caught, because he still faces the consequences of his past infringement. In order to avoid their full severity, he must settle with the publisher.

77 This discussion assumes that, absent network effects, the merit of each software equals the other's.

quent rounds, but there may be situations that are only a one-time game. Software is a durable good; once purchased it can be used forever – at least, until it is replaced by another tool or by an upgrade of the same software. Therefore, especially with the addition of high switching costs, the initial choice dictates the future outcome; it may be years before the user participates in another round of the game. Third, even if this is not truly a one-time game (because some users do change their software over time or because new users can learn from mistakes made by old users), the strategy is still winning. If lock-in is likely, there will be users who recognize the danger and others who do not. Those who recognize the danger will negotiate prior to installation and may pay lower, more competitive, prices *ex ante*; those who do not will pay the higher monopoly price *ex post*. If all users recognized the danger, avoided unauthorized installation, insisted on prior negotiations, and considered other alternatives, the software publisher would indeed be forced to compete; but, as shown earlier, using software protection would also force her to compete. The result is that the benefits of not protecting are at least as high as the benefits of protecting. As a matter of fact, the existence of businesses that pirate, get sued, and pay higher prices *ex post* suggests that people – rationally or irrationally – do swallow the bait, while, at the same time, declining rates of piracy over the years may suggest that their number is decreasing.⁷⁸

4 Piracy as a barrier to entry

The role of piracy is not necessarily limited to the stage of becoming the standard in the particular software market and exploiting potential pirates' lock-in; it can also extend to reinforcing the incumbent's dominant position by deterring new entry.

Joseph Farrell and Garth Saloner analyse the conditions under which it is feasible and profitable for an incumbent supplier of a network good to lower the price of his good in order to deter entry of a new and superior incompatible technology.⁷⁹ In their analysis, the size of the installed base of the current technology may critically affect the adoption of a new technology and may therefore constitute a barrier to entry, one that

78 The BSA reports that since its study began in 1994, there has been a steady decrease in the rate of software piracy. This trend has changed in 2000 and 2001 with a slight increase in piracy rates, attributed to the effects of a worldwide economic slowdown. See *BSA Report*, supra note 1 at 2. This slight increase, however, even if not transitory, still renders present piracy rates far below what they were in the late 1980s (see Smith, 'After the Euphoria,' supra note 18, and in the early 1990s (see Givon *et al.*, 'Software Piracy,' supra note 54 at 29).

79 Joseph Farrell & Garth Saloner, 'Installed Base and Compatibility: Innovation, Product Preannouncements, and Predation' (1986) 76 *Amer.Econ.Rev.* 940.

incumbent firms will have an incentive to buttress.⁸⁰ One strategic action, in their analysis, is predatory pricing. In the face of a threat of competitive entry by new technology, the incumbent can temporarily reduce his prices, thus keeping the competition at bay, until his proprietary technology has so large an installed base that incompatible competitive entry becomes impossible.⁸¹ The critical fact of Farrell and Saloner's analysis is that the opportunity for a new technology to supplant the current one is available only for a limited time, until the current technology's installed base is large enough to create an insurmountable barrier to entry.

Drew Fudenberg and Jean Tirole similarly describe conditions under which the threat of entry leads the incumbent firm to set lower prices than it would otherwise have done in order to eliminate or reduce the probability of entry.⁸² In their model, in the face of network effects that benefit the incumbent, a new entrant will enter the software market only if his software is sufficiently superior to the incumbent's that its superiority can compensate current users for their loss of network benefits. The incumbent will therefore have an incentive to lower his price in order to increase his installed base of users and thus increase the entry costs of new entrants.⁸³

In both models the incumbent lowers his price, presumably to all customers, in a manner that dissipates his returns. In my analysis, the publisher who tolerates piracy might suffer lower losses because he price discriminates and only some of the customers pay the lowest price.

Tolerated piracy is thus a form of strategic pricing that may have a predatory nature.⁸⁴ Although there is a consensus among courts and commentators 'that predatory pricing schemes are rarely tried, and even more rarely successful,'⁸⁵ the current scenario may be one of the instances where such predatory pricing is indeed rational, and perhaps probable, because several factors limit the cost that the monopolist bears in the predatory scheme and increase the likelihood of recoupment: first, the predatory behaviour takes advantage of the limited availability of

80 Ibid. at 942.

81 Ibid. at 943.

82 Drew Fudenberg & Jean Tirole, 'Pricing a Network Good to Deter Entry' (2000) 48 J.Industrial Econ. 373 at 374.

83 Ibid. at 375.

84 See also Danny Ben-Shahar & Assaf Jacob, 'A Preach for a Breach: Selective Enforcement of Copyrights as an Optimal Monopolistic Behavior' (2002), online: The Interdisciplinary Center Herzliya <<http://www.faculty.idc.ac.il/ben-shahar/Papers.htm>>, for a similar characterization of the predatory nature of strategic tolerance towards piracy ['Preach for Breach'].

85 *Brook Group Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209 at 226 (1993) (quoting *Matsushita Elec. Indus. Co., Ltd. v. Zenith Radio Corp.*, 475 U.S. 574 at 589 (1986)).

entry within a closing window of opportunity; second, the cost of predation is lower when it is accompanied by price discrimination, so that disfavoured (*i.e.*, legitimate) customers continue to pay the full price and the predator does not need to set prices at a predatory level across the entire range of customers;⁸⁶ third, this full price could potentially even increase over time with the growth of the size and value of the network; and, fourth, as noted earlier (Part III.B.3), some of the cost of predation-through-piracy is recovered, and even transforms into increased returns, when copyright law is enforced against ex-pirates who ultimately find themselves better off settling with the publisher rather than abandoning it. The question of whether this type of predatory pricing should be illegal is different and will be treated separately in Part IV. B.1.

5 Some temporal and geographical aspects

So far my analysis, like most previous writing on the matter, has described a two-phase scenario that takes place in a single geographic market. In the first stage, two software products compete to become the standard; in the second stage, the winner (monopolist) tries to buttress his position. Adding a geographic dimension to the analysis suggests that the two stages can occur simultaneously in different geographic markets and provides some insights into the extremely high rates of software piracy observed in some parts of the world.

A race between competing networks to become the standard may be over in one geographic market but still in progress in another. This is particularly true if the two markets differ in their level of technological development or in other respects (*e.g.*, language). In a rapidly growing market, unlike mature markets, an entrant may easily replace an incumbent supplier of a network good who has benefited from first-mover advantage. A famous example is JVC's VHS technology for videocassette recording, which replaced Sony's Betamax. Although Betamax was the first mover, with a head start of about a year and a half, it was VHS that won the race. One of the explanations for that first-mover failure is that the VCR market was not yet very mature, and so the number of units sold was too small to give Betamax much of an advantage. Thus, when JVC introduced its VHS technology, which had several advantages over Betamax, it could easily supplant it and become the industry standard.⁸⁷

86 On the relation between predatory pricing and price discrimination see generally Philip E. Areeda & Herbert Hovenkamp, *Antitrust Law: An Analysis of Antitrust Principles and their Application* (New York: Aspen Law & Business, 1996) at ¶745.

87 Stan J. Liebowitz, 'Network Meltdown: The Legacy of Bad Economics' (2002), online: Social Science Research Network <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=309879>. Liebowitz argues that the important factor in determining the victory of the VHS technology was its longer recording time. The initial Betamax tapes could record for only one hour, eliminating the possibility of watching or recording a movie

Different geographic markets differ in the percentage of the population that owns and uses computers. For example, the number of PCs per 1 000 people in the United States grew from 328.1 in 1995 to 625 in 2001, while the numbers in China during the same period grew from 2.3 to 19.⁸⁸ If it is reasonable to infer from these data that the American market is much more mature than the Chinese market, it is possible to predict that network effects and lock-in in the United States are stronger than in China. The reason for this is that although computing technology and its network effects are universal, software products still have local attributes, which magnify local rather than universal network effects. Naturally, computer users interact primarily with other people within their own communities and in their common language. Additionally, many complementary products, although developed to be compatible with the universal standard, are designed to satisfy local needs.⁸⁹ While there can be little doubt that Chinese and American users would benefit from the opportunity to exchange compatible files with each other, they will mostly interact with others within their respective localities.

The fact that the Chinese market is growing rapidly implies that there are new users who constantly join the network, but, unlike existing users, new users are concerned with compatibility with other users, not with their own old files. Therefore, they are more ready to adopt new technologies if they believe that a sufficiently high number of other users will do the same. The cumulative effect of a growing market with local attributes is that a local growing market is less inclined to adopt the universal dominant standard and may adopt its own, especially if the cost of joining the universal standard is too high. In such a case, the benefits of locality may outweigh the losses arising from incompatibility with the universal standard. This point illustrates the fact that rapidly growing markets in developing countries may pose a strategic threat to incumbent software publishers who currently dominate these markets. If an entrant is able to offer a slightly better product (in terms of quality, price, or local adaptivity) it may capture a stronghold in the developing market that will later threaten the incumbent's dominance. If the incumbent's universal standard is priced low enough, however, it may preserve its advantage of

on a single tape. Other writers suggest that the advantage of VHS was its openness, as opposed to the proprietary strategy adopted by Sony: see Shapiro & Varian, *Information Rules*, supra note 24 at 197.

88 World Bank, ICT at a Glance, online: World Bank Group <www.worldbank.org/data/countrydata/ictglance.htm>.

89 Take financial planning software, for example. A customer who purchases Quicken in the United States will find that many of its functions are irrelevant in other jurisdictions, where taxation rules are different. The software may function well on any other Windows platform, but it will be of limited use. Other examples are legal databases, road atlases, and phone directories.

universal compatibility and nevertheless become or remain the local standard as well. The same outcome is also likely if, through a lack of software protection measures and lax IP enforcement, the universal standard is *de facto* free. In this case, too, the possibility that in growing markets local networks will supplant an established standard is reduced. This may explain why many software publishers are ready to tolerate extremely high rates of piracy in some developing markets. I will discuss this point further in the next section.

C PIRACY AND EXPLICIT PRICE DISCRIMINATION COMPARED

Analysing piracy as a form of price discrimination suggests that such distribution methods are mutually substitutable. This raises two related questions. First, if piracy actually benefits the industry, why does the industry spend so much on publicized efforts to eliminate it? Second, would not it be wiser for software publishers to employ explicit and institutionalized price discrimination and achieve similar wide distribution while saving the costs of anti-piracy campaigns? In this section I will highlight some economic differences between the two methods and explain the advantages that a software publisher may achieve through piracy that cannot be achieved through explicit price discrimination.

Allowing piracy is similar to second-degree price discrimination in the sense that it enables the software publisher to offer different versions (high-price/low-risk package and low-price/high-risk package) and enables customers to choose between them according to their individual preferences, which are not known to the publisher. But in the case of piracy, unlike that of ordinary second-degree price discrimination, the low-price version does not sacrifice performance and keeps the value of the network maximized. This overcomes the risk that competitors will offer users who cannot afford the high-end version better substitutes at lower prices.

Another difference results from the efficient and rapid distribution that piracy creates. In a winner-takes-all market, economies of scale in *production* (supply-side economies of scale) can also play an important role.⁹⁰ Because the reproduction of software does not require any specialized equipment – any generic disc-reproducing device can reproduce any software – software has a characteristic of what Stan Liebowitz and Stephen Margolis term ‘instant scalability,’ meaning that the output can be increased very rapidly without the usual additional costs associated with sudden increases in output.⁹¹ Distribution through piracy takes advantage of and enhances that instant scalability. With piracy, the

⁹⁰ This is different from network effects, which are demand-side economies of scale.

⁹¹ Stan J. Liebowitz & Stephen E. Margolis, *Winners, Losers and Microsoft: Competition and Antitrust in High Technology* (Oakland, CA: The Independent Institute, 1999) 137 [Winners, Losers].

production of reproductions is decentralized and 'outsourced' to every user who is capable of copying diskettes (*i.e.*, every PC owner) or of burning CDs (*i.e.*, many PC owners). Supply can thus meet demand instantly, whenever and wherever a would-be user meets an existing one. In contrast, in a world with explicit price discrimination but no piracy, the meeting of supply and demand is centralized and hindered by the limitations of the software publisher's distribution system. If creating a large installed base of users is critical, piracy can achieve this aim more rapidly than any other distribution method, and more efficiently, because it utilizes the reproduction devices, material, and labour of pirates and because copies are delivered only to users who actually value them.⁹²

I have already mentioned that the software publisher is able to recover some of the costs of piracy at a later stage by enforcing his copyrights against the unauthorized user. With explicit price discrimination, no such recovery is possible because the user uses the software legally.

But perhaps most important are the opposite signals that each method conveys to the public and the way that such different signals affect the preferences and behaviour of users, competitors, and governments. Explicit price discrimination, in which users with low reservation prices (such as low-volume home users or users in poorer countries) are able to acquire the software legally for a very low price creates an excellent opportunity for arbitrage, and customers may seek to exploit that opportunity, to the detriment of the software publisher. In light of the first-sale doctrine, copyright law cannot be used to effectively block arbitrage, not only domestically but perhaps internationally as well,⁹³ and imposing territorial restrictions on distributors might implicate some anti-trust concerns, especially when the seller has significant market power.⁹⁴

92 Conner & Rumelt, 'Software Piracy,' *supra* note 23 at 137.

93 See *Quality King Distributors v. L'anza Research International*, 523 U.S. 135 (1998) (finding that the first-sale doctrine allows the importation into the United States, without the authority of the copyright owner, of goods sold legally abroad). Note, however, that it is unclear whether the case could be read as a wholesale acceptance of parallel importation. The case involved the re-importation of copies that were first manufactured in the United States, and Justice Ginsburg, in her concurring opinion, made it clear that she joins the Court's opinion recognizing that this case does not resolve the legality of imports of copies that were manufactured abroad (at 154). In the case of software, making a distinction based on the place where the copy was reproduced seems particularly odd.

94 In a recent case from Australia, for example, major music labels were found liable for misusing their market power when they tried to prevent parallel importation of CDs after an amendment to the copyright act specifically allowed such imports: see *Australian Competition & Consumer Commission v. Universal Music Australia Pty Ltd.* (2001), 115 F.C.R. 442. On appeal, the court reversed the decision with regard to the misuse of market power but upheld the defendant music labels' liability under the exclusive dealing provisions of the Trade Practices Act; see *Universal Music Australia Pty Ltd. v. Australian Competition and Consumer Commission*, [2003] F.C.A.F.C. 193.

Even if arbitrage could be blocked, information about legal copies that are sold elsewhere for a significantly lower price cannot be blocked, and such information is a signal that might affect users' preferences and their willingness to pay the current higher price.⁹⁵ A user's decision to purchase a legal copy of software or to pirate it depends on the value of the software, its price, and the cost of piracy. The last factor includes the individual cost one ascribes to violating the law generally or violating publishers' rights specifically (the moral cost).⁹⁶ Explicit price discrimination can affect users' moral cost. Explicit price discrimination implies, for high-value users, that the seller can profitably sell the software for a much lower price than her existing one. While favoured users may be more inclined to purchase when they are offered a discount, some disfavoured users who are required to pay a significantly higher price may feel 'ripped off,' and this may reduce their moral cost and increase their willingness to pirate. They might ask, 'If the publisher can profitably charge such lower prices elsewhere, why am I charged so much?' In contrast, when there are no significantly lower legitimate prices, there is no point of reference to compare with, and such a question does not arise.⁹⁷

While explicit price discrimination with low prices in one market highlights the higher prices in another, piracy does not send such a message. Paradoxically, it is even used to convey the opposite signal. When losses from piracy are highlighted, they help to camouflage economic profits or, at least, to justify them. A popular argument is that higher prices for software are justified because of the need to compensate publishers for the losses of piracy.⁹⁸ Moreover, the publisher's explicit policy is to urge users to prefer high-priced legitimate software over pirated software by engaging in campaigns that stress the risks of illegal use of software and over-praise the practical benefits of using licensed software.⁹⁹ If software publishers used overt price discrimination,

95 On the signalling effect of price discrimination that causes sellers to forgo it, see Eric T. Anderson & Duncan I. Simester, 'Research Note: Price Discrimination as an Adverse Signal: Why an Offer to Spread Payments May Hurt Demand' (2001) 20 *Market.Sci.* 315 (explaining that through price discrimination in which a product is being sold to a broad range of segments, a seller implicitly claims that the product is suitable for each segment. However, in the case of a premium-quality product, claiming that it is suitable for price-sensitive consumers undermines the credibility of a retailer's quality claim and can reduce both the demand from quality-sensitive customers and overall profits).

96 See Part II.B.2, above.

97 The 'theory' behind such a question is not necessarily correct. Assuming that the low price is still above the marginal cost of reproduction, this price is profitable in the short run but not necessarily in the long run. In the long run, if all users paid that low price, sales might not contribute enough profit to recover the publisher's investment, and this would affect further investment. It does not follow, however, that the average price does not contain significant economic profits.

98 See *BSA Software Management Guide*, supra note 69.

99 *Ibid.* at 3: '[T]o get the most out of your software, you have to manage it well, just as you would any other valuable company asset. Poor software management robs your

so that instead of pirates there were just legitimate users who paid a lower price, the credibility of all these arguments would be significantly diminished.

The following example demonstrates how piracy might be preferable to explicit price discrimination. Table 1 contains data about the United States and China and some hypothetical calculations performed with these data. The United States has the world's lowest piracy rates and China one of the world's highest. The table shows the piracy rates in each country¹⁰⁰ and retail prices of a basic productivity software package for PC: an operating system (Windows XP Home) and the Office XP productivity suite.¹⁰¹ The table also contains data about the gross national income (GNI) per capita in both countries in 2001.¹⁰²

Table 1 shows that the retail price of these software products in the United States and China is almost uniform. This is surprising, given the differences in income levels between the two countries. The price of the combined package amounts to 1.98 per cent of the GNI per capita in the United States and 77.7 per cent in China. In other words, the average American who wishes to purchase a legal copy of the software package will have to spend about 2 per cent of his gross annual income, while his Chinese counterpart would have to spend almost 80 per cent of his gross annual income if he sought to use the software legally. Since 75 per cent of users in the United States purchase their software legally, it is reasonable to regard US prices as 'affordable' by the majority of US consumers,¹⁰³

company of the full value of the productivity and efficiency of software. Poor software management can also easily mask software piracy, which is the installation or use of unauthorized copies of software. Software piracy is against the law and can have very costly consequences to your business. Illegal software is more likely to fail, rendering your computers and their information useless. You can expect no warranties or support for illegal software, leaving your company on its own to deal with such a failure. Illegal software is also one of the prime sources of computer viruses that can destroy valuable data throughout a company.' The risks in this argument are, of course, highly exaggerated. The nature of software piracy – which is based on digital copying of originals – is that the copy is identical to its source. A copy made of a legal copy is identical in quality, and so will be the next copy and so on. Therefore, as long as no link in the chain of copying has corrupted its copy, pirated software is as likely to fail and contains just as many viruses as the original. Furthermore, with price discrimination some users might prefer a lower price, no warranties, and no support.

100 As reported in the *BSA Report*, supra note 2.

101 The prices were drawn on July 25–26, 2002, from the Microsoft Web site: <www.microsoft.com> and <www.microsoft.com/china>. The retail prices of Microsoft products in the United States were compared to those offered by other online retailers (<www.jandr.com>, <www.radioshack.com>), but there were no significant differences.

102 United States Data Profile and China Data Profile, supra note 89.

103 By using the term 'affordable' I do not suggest that the price is high or low, competitive or reasonable. I simply mean that customers are willing to pay the price, and this implies that the price is adjusted to the way customers value the product. Additionally, it is reasonable to believe that among the 25% of users who pirate their software, there are some who could also afford to pay the retail price.

Table 1

	United States	China
BSA 2001 piracy rates	25%	92%
Price of Windows XP Home	US\$199	US\$180
Price of Office XP Standard	US\$479	US\$473
GNI per capita (2000)	US\$34 100	US\$840
Price/GNI per capita:		
Windows	0.58%	21.4%
Office	1.4%	56.3%
Combined package	1.98%	77.7%
'Affordable' price:		
Windows	US\$199	US\$4.87
Office	US\$479	US\$11.76
Combined package	US\$678	US\$16.63

while it is totally unaffordable for the majority of users in China.¹⁰⁴ Table 1 shows that the equivalent 'affordable' price in China for the combined package would be US\$16.63. It seems reasonable to assume that if that were the price of legal Microsoft software in China, piracy rates would have dropped and would become lower than their present rate of 92 per cent, despite the existence of cultural and legal differences between the two countries.¹⁰⁵

Why, then, does Microsoft forgo the opportunity to price discriminate and decrease piracy in China by charging different, but equally affordable, prices in low-income countries such as China? In order to be equally affordable to the retail price in the United States (\$678), the price in China should be about \$16. Even if Microsoft could successfully prevent

104 To illustrate the non-affordability of the price in China: in terms of percentage of the per capita GNI, the price in China is equivalent to a price tag of US\$26,496 for the combined Windows/Office package.

These data should be analysed with caution because, theoretically, it is possible that the low per capita GNI does not adequately reflect the income of PC owners in China and that they are just as wealthy as their American counterparts, making the price equally affordable. This possibility, however, seems remote.

105 Substantial differences in the level of piracy among different countries are sometimes attributed to cultural and institutional differences. For example, Donald B. Marron & David G. Steel, 'Which Countries Protect Intellectual Property? The Case of Software Piracy' (2000) 38 *Econ.Inquiry* 159, find that intellectual property receives greater protection in developed economies, that high-income countries have lower piracy, and that protection depends on cultural factors. Countries with individualist cultures have lower piracy rates than countries with collectivist cultures. Piracy rates are also lower in countries that have strong institutions that enforce contracts and protect property from expropriation. My analysis is not inconsistent with the finding of this study; it only adds another dimension: the prices of software and the pricing strategies of copyright holders.

parallel imports,¹⁰⁶ it would be impossible to prevent the ‘importation’ of information about the prices in China. Would 75 per cent of the American users be willing to pay \$678 for a product that Microsoft sells in China for \$16? While we cannot tell how many of them would, it seems that Microsoft has good reason to suspect that many of them would not. Since the US market is significantly larger than the Chinese, it is probably worthwhile for Microsoft to forgo potential revenues from China in order not to jeopardize the more important revenues that it gains in the United States. In fact, a recent article by Catalin Cosovanu points out that in two interviews that she conducted with Rene Bonvanie, Oracle’s Vice President for Marketing, and Bradford Smith, Microsoft’s General Counsel, both officials expressly confirmed this point. They explained that their companies do not charge lower prices in developing countries for fear of a marketing backlash in the home market, since they will be unable to justify charging much more in their primary market.¹⁰⁷

Another effect of explicit price discrimination is that significantly higher prices charged domestically can attract the attention of regulators. Microsoft has already drawn considerable attention from anti-trust agencies worldwide, and from private plaintiffs as well. Evidence that legal software is sold elsewhere for a fraction of the price could contribute to allegations that the prices charged to consumers in the United States and other developed countries are supra-competitive. Such evidence would certainly not help Microsoft. Indeed, the question of whether Microsoft’s prices are high or low was one of the disputed issues in the recent anti-trust case between the United States and Microsoft. Both sides (and the Court) seemed to agree that Microsoft’s pricing of Windows did not correspond to short-run profit maximization by a monopolist, but this led each side to a different conclusion. Microsoft argued that this fact showed that it lacked market power; the Court found, however, that this would not be probative of a lack of monopoly power, as Microsoft claimed, for it could be charging what seemed like a low short-term price in order to maximize its profits in the future.¹⁰⁸ Surely, Microsoft’s argument – as weak as the Court found it – would have been even weaker if its US prices were significantly higher than its

106 It is probable that Chinese versions of Windows will not be massively re-imported to the United States, but using language as anti-arbitrage tool requires that only non-English versions will be sold in non-English-speaking countries. This is probably impractical. First, it would require issuing a local version in every country; second, there are users in non-English-speaking countries who still prefer the English version; and, third, there are still English-speaking low-income countries (e.g., Nigeria, India) that can be sources of parallel importation.

107 Catalin Cosovanu, ‘Piracy, Price Discrimination, and Development: The Software Sector in Eastern Europe and Other Emerging Markets’ (2003) 31 A.I.P.L.A. Q.J 165 at 216.

108 *Microsoft*, supra note 39 at 27.

prices in other countries. It is easier to argue that the current US retail price does not reflect market power when the benchmark is the price that a hypothetical profit-maximizing monopolist would charge than to posit the same argument when there is an actual benchmark of prices charged in other countries (and no difference in cost can justify the price disparities).

Apparently, when Microsoft chooses not to protect its software and to charge uniform prices in the United States and China, it necessarily tolerates high rates of piracy in China and *de facto* price discriminates.¹⁰⁹ The covert nature of this form of price discrimination, however, avoids many of the problems that explicit price discrimination would have created. *De jure*, there are no favoured customers, domestically or abroad, who benefit from significantly lower prices, so there is no basis to complain about high prices; instead there are wicked pirates – ‘thieves’ – who steal the property of American firms, create job losses, retard innovation, and inflict higher prices on legitimate users.¹¹⁰ Thus high worldwide rates of piracy not only contribute to increased profitability by creating higher network effects, enhancing value and prices, and maintaining pre-emptive installed base of users but are used by the software industry as an asset on the public relations front and as a tool to increase users’ willingness to pay.

Another source for the preference of tolerated piracy over explicit price discrimination might be related to the durability of software. Software is a durable good and ‘wears out’ only through technological change or planned obsolescence.¹¹¹ Because of this durability, there is a theoretical possibility that a software monopolist will behave much like a software publisher in a competitive market and will be forced to sell the software at its marginal cost. This proposition is known in economics as

109 A similar phenomenon is described in Reza Ahmadi & Rachel B. Yang, ‘Parallel Imports: Challenges from Unauthorized Distribution Channels’ (2000) 19 *Marketing Sci.* 279. They explain that some manufacturers knowingly encourage parallel imports of their products in order to price discriminate within the importing market. Those manufacturers realize that by allowing parallel imports they extend the reach of their products to new customers who would not purchase from the higher-price authorized dealer. Because unauthorized dealers are perceived as removed from the manufacturer, such alternative low-price-low-service distribution channels pose a smaller risk of confusion and brand tarnishing that would harm the profits obtained through the authorized channel.

110 See *BSA Software Management Guide*, supra note 69. It might be true that piracy causes legitimate users to pay more, but this is not because of the losses the software publishers suffer but, rather, because it creates greater network externalities that enhance the value and price of the software.

111 Michael L. Katz & Carl Shapiro, ‘Antitrust in Software Markets’ in Jeffrey A. Eisenach & Thomas M. Lenard, eds., *Competition, Innovation, and the Microsoft Monopoly: Antitrust in the Digital Marketplace* (Boston: Kluwer Academic Publishers, 1999) 29 at 36.

the 'Coase Conjecture.'¹¹² The idea behind this conjecture is that the monopolist is tempted over time to offer prices closer and closer to cost in order to accomplish additional sales from those who have not yet made purchases. Because consumers anticipate the monopolist's attempt to work its way down the demand curve, first selling to the highest-value users and eventually offering its product at marginal cost, even consumers who place a higher value on the software will be unwilling to pay high prices if they anticipate rapid price reductions; the monopolist's future sales thus compete with its earlier sales. However, if the monopolist is able to credibly commit not to expand output and to continue to charge the high monopoly price, consumers with high value know that they cannot gain from deferring their purchase and will buy the software at the supra-competitive price in the first period.

While making such a commitment to charge high prices is generally problematic, network effects exacerbate the problem because they create a bigger incentive to increase output than under ordinary conditions and, even worse, to do it promptly. Piracy can solve this problem because it can make credible a commitment to charge a uniform high price intertemporally. By *de facto* letting low-valuation customers use the software, the publisher excludes those customers from the repository of potential customers, credibly signalling that it is not going to lower its price in the future in order to satisfy their demand.¹¹³ Piracy, in this case, is similar to Coase's example of a monopolist landowner who commits to monopoly pricing by donating the excess land to the government to be used 'in the public interest,'¹¹⁴ since in both cases there is no unmet demand left and no danger of resale of the good. By contrast, explicit contemporary price discrimination makes a commitment not to lower prices in the future less credible because by selling today at a lower price for lower-demand customers, the publisher signals that it is willing to lower its price and meet consumers' demand when necessary. Consequently, high-valuation consumers may anticipate that if they withhold their purchases, the publisher may well try to persuade them to enter the market by lowering the price targeted to them in the future.

D GENERAL CRITICISM ON THE SIGNIFICANCE OF NETWORK EFFECTS

Although the acknowledgement of the existence of network effects is mainstream today,¹¹⁵ not all agree on their significance. Economists

112 Ronald H. Coase, 'Durability and Monopoly' (1972) 15 J.L.& Econ. 143.

113 See Lisa N. Takeyama, 'The Intertemporal Consequences of Unauthorized Reproduction of Intellectual Property' (1997) 40 J.L.& Econ 511.

114 See Coase, 'Durability and Monopoly,' supra note 112 at 145.

115 Lemley & McGowan, 'Legal Implications,' supra note 36 at 488 (citing, indirectly, economist Garth Saloner).

Liebowitz and Margolis, in their critique of the significance of network theories and the US government's legal proceedings against Microsoft, argue that network effects may indeed lead to monopolies, but without the evils of monopolies, that is, without higher prices, lower output, and the resulting deadweight loss.¹¹⁶ Instead, they argue, empirical evidence shows that software prices have decreased over the years while output has increased; in an environment where one monopoly replaces another, an attempt to exploit monopoly by restricting output and raising prices is suicidal.¹¹⁷

The analysis of Liebowitz and Margolis, however, does not take into account the phenomenon of piracy, and the existence of this phenomenon may be the missing link between the theory of networks and the empirical evidence. At any given price of software, the rate of piracy is a measure of the potential deadweight loss that would have occurred had the law been strictly adhered to. All pirates, by definition, are customers who are willing to pay a price above the cost of reproduction. Some of them, however, are not willing to pay the price charged by the publisher. In a world where no copyright is infringed – whether because all customers obey the law or because technology prevents piracy – many pirates, those who cannot afford to pay for software, would be forced out of the market. The latter group reflects the deadweight loss that any given software price creates.¹¹⁸ If current software prices do not result in a decrease in output and no deadweight loss is observed, it is because piracy mitigates that loss, not because the price for legal software is not monopolistic. This is just another example of a case in which price discrimination diminishes the deadweight loss that monopoly creates. Therefore, when piracy is tolerated, raising prices is not suicidal, as long as those who cannot afford to pay the price can use a pirated copy of the software instead of purchasing it.

Additionally, Liebowitz and Margolis argue that over the period that they examined retail prices of software in the United States indeed declined, whereas network theory predicts that they should have increased. A missing link in their analysis is the fact that, during the same period, piracy rates in the United States have dramatically declined too (from 80 per cent in the late 1980s to less than 30 per cent in the late 1990s). If higher prices engender higher piracy rates and lower prices decrease piracy rates,¹¹⁹ it may well be that the decline in prices does not

116 Liebowitz & Margolis, *Winners, Losers*, supra note 91.

117 Ibid. at 11.

118 This deadweight loss is a necessary result of the copyright laws and is part of the trade-off between the incentive to innovation and the constraints on its dissemination that underlie all intellectual property laws.

119 See Conner & Rumelt, 'Software Piracy,' supra note 23 at 128.

necessarily reflect competitive pressures of potential entry but, rather, indicates a better understanding by Microsoft and other software publishers of the optimal mix of price, piracy, and the intensity of enforcement. It may well be that if we look at the price paid by all US PC users – legitimate users and pirates alike – we will find that although the price of legal software has decreased, the average spending per user has increased.

The main criticism of Liebowitz and Margolis is not about the existence of network effects but, rather, about the significance of the related concept of lock-in and the notion that it dictates future outcomes ('path dependence'). In a nutshell, the authors distinguish three degrees of lock-in or path dependence. First-degree path dependence is present whenever there is an element of persistence or durability in a decision. The person making the decision has all the relevant information to make the right decision, with full awareness that it might not be the optimal one at any given time in the future. Second-degree path dependence exists when people do not have perfect information and a decision that seems to be efficient at the time when it is made turns out to be inefficient and regrettable in retrospect, when new and previously unavailable information becomes known. Third-degree path dependence exists when individuals knowingly fail to make the most efficient decision because in order to make the most efficient one they need to coordinate their actions with other peoples' actions and such coordination is somehow unattainable.¹²⁰ Liebowitz and Margolis maintain that only the third form of path dependence, because it is remediable, can be considered inefficient in any meaningful manner.¹²¹ They argue that network effects can lead to inefficient outcomes only in the third type of path dependence: when a superior technology is available and preferable, but we all stick to the old technology because of our inability to coordinate the switch with all other users. Nevertheless, while this is theoretically possible under a set of stringent conditions, in practice, so they argue, it rarely happens. This is because, in real markets, such inefficiency is a profit opportunity for some entrepreneurs. In their words,

Inefficiency means that there is some feasible change for which the benefits outweigh the costs. That is to say, there exists a potential surplus. The person who can figure out a way to bring about the necessary reallocation and capture some of the net benefit will enjoy a profit. Where property rights are clear and freedom of contract is broad and secure, inefficiencies will face assault from profit-seeking entrepreneurs.¹²²

120 Liebowitz & Margolis, *Winners, Losers*, supra note 91 at 51–6.

121 Ibid.

122 Ibid. at 239.

Although the concept of lock-in is central in the analysis offered by this article, for an understanding of the effects of piracy the weaker forms of lock-in suffice. Lock-in can be exploited by software publishers to extract higher prices from ex-pirates not only in cases of inefficient third-degree path dependence but also in its weaker forms.

The findings of King and Lampe may seem to provide another basis for scepticism about the significance of the story of this article because in the context that they examine – the effect of piracy on other users' willingness to pay – their results show that tolerated piracy could be profitable only under four strict conditions.¹²³ If such conditions rarely exist, then the story of this article is, of course, not very interesting, at least not from a policy perspective. Nevertheless, while the ultimate answer to the question of whether such conditions are rare or not is, of course, an empirical one, I document in this article the existence of some factors that suggest that King and Lampe's four conditions may be quite common.

King and Lampe's first condition is that some users have greater ability to pirate than others. Since we deal with cases in which software publishers choose not to install technological protection measures, most users must have similar *technical* ability to pirate (they simply need to copy the software using ordinary hardware); yet users may still differ in their propensity to pirate. This depends, *inter alia*, on the cost of being found liable for infringement and the probability of being detected and sued.¹²⁴ Under such conditions, and in software products that are used by home users, small businesses, and large business users and by users in both developed and less developed countries, some users have greater propensity to pirate than others. Home users (and small businesses) probably have greater propensity to pirate than larger businesses because infringement by large businesses is easier to detect and because courts will probably feel more comfortable in awarding high damages in the case of infringing businesses than in the case of infringing home users. Similarly, users in developing countries, where intellectual property laws or their enforcement are often laxer than in the developed world, probably have greater propensity to pirate too. In such cases, King and Lampe's third condition – that the ability to pirate is inversely related to the willingness to pay – is likely to apply, since home users, small businesses, and users in developing countries are generally less affluent and derive smaller benefit from software than business users in developed countries. This article's theory is also consistent with King and Lampe's second condition: that the software publisher cannot price discriminate explicitly. I have shown earlier that the fear that explicit price discrimination might

¹²³ *Supra* note 63.

¹²⁴ See Part II.B.2, above.

induce arbitrage, negatively affect paying users' willingness to pay, and induce regulatory intervention constrains software publishers' ability to price discriminate, even if it could be done technically. I have also considered the possibility that explicit price discrimination is not chosen because it would deprive the publisher of the ability to hold up pirates once they are detected. The fourth condition, that the number of potential pirates is relatively small compared to the number of paying users, also seems to be prevalent. The 2002 worldwide rate of piracy was 40 per cent,¹²⁵ and the piracy rate in OECD countries – which account for 95 per cent of the packaged software market¹²⁶ and where 77 per cent of the PCs in the world are located – was 31 per cent.¹²⁷ On average, two-thirds of software users purchase their software and only one-third pirates it. My argument, therefore, is consistent with King and Lampe's findings.

IV *Legal and policy implications*

The effects of piracy or protection on the prices consumers pay, on the profits publishers earn, and on general welfare are ambiguous. Conner and Rumelt have observed that in the face of network effects, less protection (and increased piracy) can lead in some cases to higher prices and higher profits, in others to higher prices and lower profits, in some other cases to lower prices and higher profits, or to lower prices and lower profits.¹²⁸ Because software publishers are profit maximizers, they are likely to choose the strategy that will increase profits, while prices that buying customers would pay can be higher or lower.

The first policy implication is that there is no uniform rule that can be optimally applied to all markets. For example, some governments, believing that piracy is an evil that should be eliminated, may consider requiring hardware manufacturers to install measures against copying¹²⁹

125 See *BSA Report*, supra note 2.

126 Organisation for Economic Cooperation and Development, *Information Technology Outlook 2002 – Highlights 5* (2002), online: OECD <<http://www.oecd.org/dataoecd/63/60/1933354.pdf>>.

127 Piracy rates for individual countries were derived from the *BSA Report*, supra note 2. The BSA study does not aggregate piracy rates for OECD countries. Piracy rates for OECD countries were derived by multiplying the number of PCs per country by that country's piracy rate, aggregating the number of pirated copies in all OECD countries, and calculating the ratio of pirated copies in OECD countries. The data on number of PCs per country is from International Telecommunication Union, *World Telecommunication Indicators 2002* (2003), online: ITU <http://www.itu.int/ITU-D/ict/statistics/at_glance/Internet02.pdf>.

128 Conner & Rumelt, 'Software Piracy,' supra note 23.

129 See, e.g., Senator Fritz Hollings' introduction into Congress of the Consumer Broadband and Digital Television Promotion Act (U.S., Bill S. 2048, *Consumer Broadband and Digital Television Promotion Act*, 107th Cong., 2002). This bill, in an effort to combat

or to zealously prosecute pirates. Courts could reach similar results by easily imposing liability for contributory infringement on hardware manufacturers and other intermediaries.¹³⁰ Other policy makers, possibly inspired by the insights of this article and worried by the possibility that software publishers will use the threat of litigation to extract extra payments from users or by the strategic use of piracy to deter competitive entry, might consider requiring software publishers to install anti-piracy protections by denying them a remedy if they fail to do so. While each of these measures may achieve some benefits in some cases, they may be harmful to software publishers and customers (buying and pirates alike) in others.

In addition, tolerating piracy can be profitable only as long as the rate of piracy is controlled; it may be profitable only as long as there are enough paying customers. Thus even a non-protecting publisher, in order to maintain the optimal level of piracy, must have tools to exclude users when the rates of piracy exceed that optimum. Thus it is possible to assume that software publishers resort to the courts (as well as embark on media anti-piracy campaigns) when they believe that the rates of piracy have exceeded those they consider optimal. This is a warning against a sweeping conclusion that if piracy is actually profitable it should be legitimized, or at least outlawed only when the software publisher has taken technological measures to prevent it. A second warning is against courts second-guessing publishers' business strategies and denying a remedy in the belief that tolerating piracy is in the publisher's best interest.

A third implication relates to the fact that piracy mitigates the social problem of potential deadweight loss that the pricing of copyright protected material generally creates. The special case of network effects creates an instance in which, at some levels of piracy, the inherent trade-off of intellectual property, which favours monopoly pricing and the long-term incentives for investment in innovative products at the cost of short-term deadweight loss, does not exist and the two conflicting interests are actually aligned. At that level, tolerance towards piracy is Pareto

piracy of digital content such as music and video, would require producers of digital media devices to embed copy protection standards, those standards to be either agreed upon by copyright owners and the consumer electronics industry or imposed by mandate of the Federal Communications Commission.

130 See, e.g., *Sony Corp. v. Universal City Studios*, 464 U.S. 417 (1984) and *A&M Records. v. Napster*, 239 F.3d 1004 (9th Cir. 2001) (holding Sony not liable for contributory infringement because it did not have the requisite level of knowledge of direct infringement when it made and sold equipment capable of both infringing and substantial non-infringing uses, but holding Napster liable for contributory infringement because it was demonstrated that it had actual knowledge that specific infringing material was available through its file swapping service).

optimal.¹³¹ Therefore a policy that will over-deter pirates, like a policy that will under-deter them and might induce publishers to ultimately protect software, might lead to the re-creation of the deadweight loss.

What this last point highlights is that when strong network effects are present, piracy should not necessarily undermine the incentives for innovation – contrary to the popular view advocated by the software industry. There may, of course, be instances when piracy rates will exceed what the publisher believes are the optimal rates and the publisher may wish to reduce them, but it does not necessarily follow that the existence of piracy at such a level decreases the incentive to innovate, because the effect of an additional profit or loss (from a decrease or increase in the rate of piracy) on the incentive to innovate is probably diminishing after a certain level of profit has been reached.

All of the above suggests that although the case of piracy in a network effects setting departs from the governing paradigm of copyright law, which assumes that every unauthorized copy of a protected work harms the copyright holder, this departure does not necessarily require changes in the applicable law. The present *status quo*, in which many software publishers do not protect their software and many users take advantage of this lack of protection and use unauthorized copies, seems generally to benefit all the parties involved, and changing the *status quo* might only cause harm.

Nevertheless, in some cases this theory might have several implications: for private disputes between copyright holders and unauthorized users (typically infringement suits); for anti-trust suits where the copyright holder would be accused of using piracy to unlawfully create, maintain, or use his market power; and for the way intellectual property laws are designed or enforced by public agencies.

A GENERAL POLICY IMPLICATIONS

Although no major policy changes are warranted, our theory might contribute to a better-informed decision-making process. For example, unless it is clear that piracy rates undermine incentives for investment in innovation and that implementing protection technologies cannot efficiently restore those incentives, there seems to be little justification for increased spending on enforcement of anti-piracy rules by government agencies. If piracy does not significantly affect the quantity and

131 In practice, it is probably only near Pareto optimal, because it is possible that the applied anti-piracy measures are under-deterrent and actual piracy rates are too high, or that the measures are over-deterrent and piracy rates are too low and some deadweight loss exists. It is also possible that because, with piracy, the publisher does not get the maximum return on her investment, the level of investment in creating new software is below the optimum.

quality of software written or otherwise negatively affect the general welfare, anti-piracy campaigns serve primarily as a tool for transferring wealth from users to publishers. These results are neither necessarily good nor necessarily bad if we cannot have grounds for preferring one group or another, so, as long as software publishers are granted copyrights, they are and should be within their rights when they try to pursue them. But, at the same time, aiding such copyright holders with additional funds spent on enforcement of copyright law by government agencies (through criminal proceedings, for example) is merely an additional subsidy for copyright holders with no positive influence on the general welfare and, as such, may not be considered by some as the most appropriate use of taxpayers' money.

This last point may be particularly relevant to developing countries with high rates of piracy. Such countries are frequently subject to pressures to implement and enforce intellectual property laws.¹³² But, as noted earlier, when copyright holders charge users in developing countries similar prices to those charged in developed countries, piracy may be seen as a natural market response to the deadweight loss that software prices would have created if the law were obeyed. It would seem reasonable for developing countries, when asked to legislate or enforce copyright laws, to demand that legal copies be made available at a price their citizens will be able to afford, and it seems understandable that they decline to legislate or enforce such laws when the prices of copyrighted material imply tremendous deadweight loss to their economies.

B IMPLICATIONS FOR ANTI-TRUST LAW

Since the theory of this article deals with the use of piracy as an aid to creating monopoly and later to maintaining and exploiting it, it is only natural to consider what anti-trust law might have to say – or should have to say – about it. Typically, a dominant software publisher might face anti-trust allegations from the government, from losing competitors, or from customers who believe they are paying too much. While generally the mere exploitation of market power by charging higher-than-competitive prices is not unlawful,¹³³ when market power has been obtained or

132 The TRIPS Agreement requires member countries to implement a minimal level of intellectual property protection and enforcement, which generally is on par with the levels of protection in developed countries. Failure to comply with the requirements of TRIPS may result in trade sanctions. Additionally, failure to implement US standards of intellectual property protection may result in unilateral trade sanctions by the United States under s. 337 of the *US Tariff Act of 1930*, 19 U.S.C.A. § 1337, or the more aggressive provisions of s. 182 of the *Trade Act of 1974*, 19 U.S.C.A. § 2242 (commonly known as 'Special 301').

133 See, e.g., Herbert Hovenkamp, *Federal Antitrust Policy*, 2d ed. (St. Paul, MN: West Publishing, 1999) at 269. In other jurisdictions, however, high prices may be considered

maintained unlawfully, the higher prices could be indirectly actionable because they represent the injury caused to consumers. In any event, anti-trust liability must be based on an anti-competitive act other than charging higher prices.

There are two possible anti-trust scenarios in our case. One focuses on the use of piracy as a tool to achieving monopoly and a tool to preserve that status by creating a higher barrier to entry; a typical plaintiff under this scenario is an excluded competitor or the government. The other scenario is focused on exploiting lock-in to charge higher prices. In this scenario, an unauthorized user who is locked in to the technology is sued for copyright infringement and responds by raising an anti-trust claim, either in a countersuit or as a defence through the application of the copyright misuse doctrine.¹³⁴ But since higher prices are not actionable *per se*, the user must base his claim on an anti-competitive act, and this requires a proof of the use of piracy as an exclusionary or predatory practice. Therefore, the first step should be to find out whether a strategic tolerance towards piracy can or should be regarded as a predatory practice for the purposes of anti-trust law.

1 Piracy as a predatory practice

A major problem for any attempt to categorize tolerance of piracy as a predatory practice is that piracy, unlike underpricing of products by a seller, is not something that a software publisher does. Rather, it happens to him, and it probably would have happened – although to a lesser degree – even if he had protected his software. It might therefore seem rather perverse to base liability on acts that are beyond someone's control. Imposing liability may be even more problematic when the software publisher's express policy is that he is harmed by piracy and acts to eliminate it.¹³⁵ It would therefore require any claimant to prove that,

an abuse of dominant position. In the European Union, for example, an abuse of dominant position may consist in 'directly or indirectly imposing unfair purchase or selling prices or other unfair trading conditions' under art. 82(a) of the *Treaty Establishing the European Communities and Certain Related Acts*, 2 October 1997, O.J. L. C340/1; art. 82(b) provides the same with respect to 'limiting production, markets or technical development to the prejudice of consumers.' The European Court of Justice (ECJ) ruled with respect to this article that 'charging a price which is excessive because it has no reasonable relation to the economic value of the product supplied is ... an abuse': see *United Brands v. Commission*, C-27/76, [1978] E.C.R. 207, C.M.L.R. I-429. Nevertheless, the ECJ has never positively found that excessive prices constituted an abuse, and even the European Commission has not been condemning excessive prices since *United Brands*: see Valentine Korah, ed., *Competition Law of the European Community*, 2d ed. (Newark, NJ: LexisNexis, 2001) at § 3.04[3][a].

¹³⁴ See discussion at Part IV.C.1.a, below.

¹³⁵ But see Ben-Shahar & Jacob, 'Preach for Breach,' *supra* note 84 (noting the possibility that a software monopolist might choose to prefer tolerating piracy precisely in order

despite the publisher's overt anti-piracy policy, (a) piracy could be reduced substantially by adopting protection measures; (b) the software publisher declined to take such measures; and (c) this failure is deliberate and amounts to a wilful act. This is a heavy factual burden, but, for our analysis, let us assume that it is met and that the court is satisfied that, despite the publisher's policy of fighting piracy, he actually deliberately chose not to prevent it.

Another difficulty for any predatory theory is the widely held view that predation is not very plausible and liability should not be easily imposed. However, as I noted earlier, the context of network effects may be one of the rare instances in which predation will be profitable and can occur.¹³⁶

Because tolerating piracy is not merely a question of pricing strategy, it would be useful for our discussion to use the following wider definition of predation:

[P]redation involves aggression against business rivals through the use of business practices that would not be considered profit maximizing except for the expectation that (1) actual rivals will be driven from the market, or the entry of potential rivals blocked or delayed, so that the predator will gain or retain a market share sufficient to command monopoly profits, or (2) rivals will be chastened sufficiently to abandon competitive behavior the predator finds threatening to its realization of monopoly profits.¹³⁷

When large-scale piracy is tolerated, it may fit the first definition. Because piracy implies lost sales of software, tolerance towards large-scale piracy cannot be considered profit maximizing in the ordinary course of business, absent strong network effects. My analysis, however, has highlighted four outcomes of piracy that make it profit maximizing in a network setting: (a) piracy increases the value of the software and the profits of the publisher; (b) if the network effects created by one software are sufficiently greater than those created by its rivals, it may win the entire market; (c) piracy may lead to increased hold-up power *vis-à-vis* locked-in users; and (d) piracy may create higher barriers to entry.

Of all these outcomes, only the fourth might be anti-competitive. The first is clearly not: a practice that creates a more valuable product is pro-competitive, and there should be even less complaint when it is achieved through lower prices and smaller deadweight loss. Moreover, when network effects are strong, each of the competitors in a market may find it beneficial to increase the value of his software through piracy, penetra-

to evade the unlawfulness of 'traditional' predatory pricing, and advocating the use of anti-trust law and the doctrine of copyright misuse in order to 'pierce the veil' covering such wrongful activity).

¹³⁶ See Part III.B.4, above.

¹³⁷ *Neumann v. Reinforced Earth Co.*, 786 F.2d 424 at 427 (D.C. Cir. 1986).

tion prices, or even paying customers outright to use the software,¹³⁸ so this outcome is perfectly compatible with a competitive market. Therefore, the practice may be regarded as profit maximizing for its own sake, independent of its potentially exclusionary effect, thereby failing the first test for predation. The second outcome may seem anti-competitive – after all, what could be considered more anti-competitive than a practice that drives out competitors from the market and creates a monopoly? – but it is not. In such a case the monopolistic result is only a consequence of functioning market mechanisms, the operation of which anti-trust laws seek to preserve. When a single software dominates the market because there are more benefits for users in adhering to one standard, there is nothing anti-competitive in the situation. If the market is doomed to domination by a single firm, there is little point in outlawing such a result, particularly if the means to achieve it benefit consumers. Furthermore, any attempt to intervene in this process might lead to the inferior result of a lengthy or even interminable standards war.¹³⁹

The third outcome, the increased hold-up power, is just a result of the second: it is one of the benefits for the winner, and one of the methods by which he can exploit his market power, but it is not exclusionary. The fourth outcome, however, might be considered anti-competitive, to the extent that the winner is able to create an insurmountable barrier to entry. In such a case consumers might be locked in to inferior technologies even though they would all be better off if they switched to new ones. Such insurmountable barriers to entry are described by Farrell and Saloner whose analysis emphasizes a ‘window of opportunity’ – a limited period during which a superior technology can supplant the existing one.¹⁴⁰ But even according to Farrell and Saloner, this is not necessarily a welfare-reducing result, because network effects can also create an adverse result they call ‘excess momentum’ – a situation of inefficient adoption of a new technology, in which users switch to the new technology not because they believe it is worthwhile to switch to but because they see others adopting it and fear that they may be stranded with the old one. In this case predation can prevent the switch and be welfare enhancing. Because of these ambiguous effects on welfare, Farrell and Saloner believe that ‘it would be extremely difficult (if not impossible) to frame a legal rule that would make the correct diagnosis in all cases’ so their anti-trust recommendation is limited to ‘a greater than usual degree of cau-

138 See Shapiro & Varian, *Information Rules*, supra note 24 at 273.

139 This analysis assumes that the competing products are of the same quality (or, at least, that there is no meaningful way of objectively ascertaining which of them is superior) and no other exclusionary practice is involved. We might reach different conclusions if an objectively inferior technology excludes an objectively superior one and predatory pricing is just one of a set of exclusionary practices.

140 Farrell & Saloner, ‘Installed Base,’ supra note 79.

tion.’¹⁴¹ Even if we apply such caution and are able to isolate the cases of inefficient lock-in that predatory practices maintain, it is still doubtful whether, in practice, such insurmountable barriers to entry actually exist. According to Liebowitz and Margolis, for example, such inefficient lock-in simply does not happen, because it creates a profit opportunity for entrepreneurs who wish to become the next-generation monopoly. If the technologies that they develop are superior enough, they will create additional value and enough surplus to subsidize or otherwise induce users to switch to the new technology. One of these methods would be, again, ‘predatory’ pricing. So, in their analysis, the nature of such markets is competition between ‘serial monopolies’ that prey on their rivals only to later fall prey to newcomers. If that is the case, there is little point in interfering with the process, and anti-trust law would do better to assure that its efficiency is not impeded.¹⁴²

Even if we accept that lock-in to inefficient technologies is theoretically possible, in practice it would be extremely difficult to ascertain whether the current technology dominates because it is efficient for users to stay with it or because there exists an inefficient lock-in; whether the failure of a new software is a result of inefficient lock-in or whether the software is just not good enough. Any court faced with such questions would have to struggle with the task of comparing the relative qualities of software and determining whether society would be better off with the new technology or with the old. The case of MS-DOS and Macintosh demonstrates the difficulty. Even if, at the time when MS-DOS was the dominant operating system, many could agree that the graphic user interface of Macintosh presented a technologically better operating system than the command-line interface of DOS, it is not at all clear that it has been economically superior too, when one calculates the total costs and benefits associated with a PC system versus a Macintosh.¹⁴³ Even if a court thought it could determine which of the systems is economically superior, in order to determine whether consumers are efficiently or inefficiently locked in to DOS it would have to calculate the total benefits from switching to Macintosh minus the total switching costs and compare

141 Ibid. at 951.

142 Liebowitz & Margolis, *Winners, Losers*, supra note 91. See also Dennis W. Carlton & Robert H. Gertner, *Intellectual Property, Antitrust and Strategic Behavior* (2002), NEBR working paper W8976, online: National Bureau of Economic Research <<http://www.nber.org/papers/w8976>>.

143 See Liebowitz & Margolis, *Winners, Losers*, supra note 91 at 127–9, for their discussion on the overall economic superiority of DOS over Macintosh. This is an easy case because Macintosh had a significant presence in the market at the time. If the comparison is to be made with new software that is kept out of the market, it would be totally speculative, because it is impossible to assess the benefits of software that nobody uses.

the result to the total benefits of staying with DOS. In addition, it would have to consider the prospect that a third operating system with lower switching costs would be developed (*i.e.*, MS Windows) or even that a fourth 'X' technology that is superior even to Macintosh would be introduced in the future, rendering it worth waiting for.

Given the first difficulty of imposing anti-trust liability on default rather than on conduct, the ambiguous results of predation-through-piracy, and the difficulty of discriminating between efficient and inefficient lock-in, it seems that the prospects for any use of our piracy and network theory in the anti-trust context are slim.

2 *Anti-trust and the hold-up problem*

One of the consequences of piracy in a network setting is the seller's ability to exploit unauthorized users' lock-in and ultimately extract a greater portion of the consumers' surplus. It may seem unproblematic in the case of a user who had ample opportunities to purchase software legally, and could afford to pay the market price, but knowingly decided to take a risk and pirate the software, with a clear understanding that he might be sued and ultimately pay a higher price. But in practice things may be more complicated. A user, especially if it is a large organization, might initially purchase legal copies but later, through error, negligence, or carelessness, end up with some unauthorized copies. In such cases the use of copyright law to hold up that locked-in user and extract exorbitant payments from him might seem unjustified and opportunistic. Since the decision of the US Supreme Court in *Kodak v. Image Technical Services*,¹⁴⁴ situations of lock-in and hold-up could potentially be treated by anti-trust even if the seller does not have market power in the primary market but only in an aftermarket. Since, in our case, the software publisher presumably has market power in the primary market (the market for software) and this market power intensifies the power to hold up his customers, it might seem like a good candidate to apply a *Kodak*-type analysis. But even in *Kodak* the anti-competitive act was the refusal to supply replacement parts to independent service providers and not the resulting price increase.¹⁴⁵ This implies that an anti-trust claim should be based on some anti-competitive practice other than monopoly pricing. Additionally, crucial to the decision in *Kodak* was the change in Kodak's parts supply policy. Since Kodak initially did supply replacement parts to independent

144 *Eastman Kodak v. Image Technical Services*, 504 U.S. 451 (1992) [*Kodak*].

145 As Hovenkamp notes, even if Kodak had been ordered to supply independent repairers parts on a non-discriminatory basis, consumers were not necessarily better off, because if it had market power in the market for services it could raise the price of parts rather than the price of service. The only way to address that problem would be detailed price regulation. See Hovenkamp, *Federal Antitrust Policy*, *supra* note 133 at 300.

service providers, consumers presumably could not anticipate the change in its policy and accurately calculate the additional cost in their initial purchasing decision.¹⁴⁶ In contrast, in light of existing anti-piracy campaigns, it could hardly be argued that an infringing software user cannot expect to be sued. This all strengthens our analysis that anti-trust law is not the proper vehicle to address the problems that may be associated with a policy of tolerating piracy. It does not follow that law cannot, or should not, address the problem of hold-up; it only suggests that a remedy should be found in other fields of law, such as contract law¹⁴⁷ or copyright law, as will be discussed shortly.

On their face, and when analysed in isolation, increased payments resulting from hold-up seem mere transfers of wealth from users to copyright holders and, as such, neutral in terms of efficiency. But such transfers may have some efficiency implications. A positive one is that, to the extent that they increase copyright holders' profits, they can contribute to incentives to develop innovative software; but such a benefit seems marginal at best, given the already high incentive that achieving market dominance creates and the unpredictable nature of such extra earnings. An efficiency loss results from the extra costs that users incur through software management in order to reduce the risk of being held up as a result of inadvertently or negligently creating illegal copies. These costs could be avoided if software were protected and users were forced to negotiate prior to being locked in to the software, but, as I concluded earlier, mandatory protection could lead to inferior results for both publishers and users, so requiring publishers to protect their software – which, of course, has its costs too – does not seem to create an optimal result.

So far, I have not observed significant economic concerns with regard to the way in which tolerated piracy is strategically used by publishers, neither in the case of predation nor in the case of holding up users. It does not follow, however, that the law is or should be indifferent to such strategic behaviour. Such behaviour can be considered problematic because it may be seen as unfair (in the case of users who are forced to pay higher prices *ex post*) or as dishonest (because a publisher who publicly condemns piracy but actually profits from it is not acting truthfully). Values of fairness and honesty, although generally outside the scope of economic analysis, are well within the domain of law, and lawyers often seek to craft solutions that promote them and discourage behaviour to

146 Ibid. at 298–9.

147 See, *e.g.*, Benjamin Klein, 'Market Power in Antitrust: Economic Analysis after Kodak' (1993) 3 Sup.Ct.Econ.Rev. 43 at 62 (suggesting that *Kodak*-type hold-up problems, if they are not best solved by the interacting parties, would be better addressed by contract law than by anti-trust).

their contrary.¹⁴⁸ In our case, an optimal solution would seek to minimize the socially negative effects of such strategic behaviour by a software publisher while preserving the incentives for innovation, combined with the benefits from increased number of software users and minimized deadweight loss. The next section will explore the possible consequences of this article's theory to copyright law and whether the latter can be used to craft such a solution.

C COPYRIGHT LAW

According to the basic paradigm of copyright law, piracy harms the copyright holder because it deprives him of opportunities to profit from his property, and this eventually harms society because the harm to the copyright holder decreases and threatens incentives for innovation. Although by the grant of property rights in the protected works the copyright holder might have market power and restrict output in order to raise price and profits, the overall benefit to society from creativity and innovation outweighs the losses that result from that market power. In accordance with this paradigm, the law provides remedies to a copyright holder whose protected work has been copied without authorization, while at the same time it imposes some limitations on the copyright holder's ability to exercise market power, thus trying to minimize that trade-off. The theory outlined here departs somewhat from that paradigm because it identifies a situation in which network effects result in the alignment of the two conflicting interests. Piracy, which clearly benefits the pirates, at some levels also benefits the copyright holder and other users, and profits (and incentives to innovate) are maximized when output is increased rather than restricted. In this section I will explore how and to what extent copyright law could respond to the theory of this article. The setting is a hypothetical infringement suit filed by a software publisher against an unauthorized user, in which the infringement is not disputed but the defendant wishes to avoid, or at least limit, her liability with the aid of the principles outlined here. Nor is it disputed that the desire of the software publisher is to maximize the network effects with the aid of piracy and his consequent decision not to protect his software.

1 Defences

Copyright law acknowledges several defences. For the defendant, the main advantage of a defence is that it frees her of liability, meaning that

148 The promotion of such values, however, is not necessarily at odds with economists' concerns about efficiency. Honesty, for example, can have economic significance because it helps reduce transaction costs – see, e.g., Richard Posner, *Economic Analysis of Law*, 5th ed. (New York: Aspen Law & Business, 1998) at 284 ('Honesty, trustworthiness, and love reduce the costs of transactions' – yet it seems that generally the law, as we know it, tends to have a broader comprehension of such values than can be captured by mere economic analysis.

she is entitled to continue with the unauthorized use of the software and is thus relieved from the financial burden of obtaining a licence.

a Abandonment and estoppel

My theory rests on the assumption that software publishers could technically have protected their software but intentionally failed to do so, with full knowledge and intent that the software be used without authorization. This might give rise to an argument that such a failure amounts to abandonment of the software or, alternatively, that the copyright holder is estopped from enforcing his copyright.

Under existing law, abandonment occurs only if there is intent by the copyright proprietor to surrender rights in his work and can be established only by an overt act evincing such intent.¹⁴⁹ Mere inaction would not constitute a manifestation of intent to abandon. These requirements seem to suffice for the rejection of that defence in the majority of cases involving commercial software where publishers constantly declare how dearly they cherish their intellectual property rights. Additionally, it is usually enough for the copyright holder to affix a copyright notice in order to overcome any claim for abandonment, and the law does not recognize limited abandonment on the basis of a failure to prosecute other violators.¹⁵⁰

The estoppel defence in copyright infringement cases is based on the following four elements: (1) plaintiff knew about defendant's infringing conduct; (2) plaintiff must intend that his conduct be acted on or must act such in a way that the party asserting the estoppel had a right to believe it was so intended; (3) defendant must be ignorant of the true facts; and (4) defendant must rely on plaintiff's conduct to his detriment.¹⁵¹

The non-protecting software publisher may not know specifically about every infringing user, but in a case of software that is a *de facto* standard, a court may construct knowledge when the publisher knows that the user uses a certain type of hardware. For example, if Microsoft knows that a user uses an Intel-based PC, the chances that he uses Windows as his operating system are 95 per cent, and a willing court may decide that this is enough to establish the required knowledge for the first element. The second element may be fulfilled by the publisher's strategic decision not to protect in order to create the largest possible installed base of users, legitimate and unauthorized alike. The specific investment required by the user in mastering the software and other

149 See Melville B. Nimmer & David Nimmer, *Nimmer on Copyright*, release 59 (San Francisco: Matthew Bender & Co., 2002) at vol. 4 § 13.06 and the references therein.

150 Ibid.

151 *Quinn v. City of Detroit*, 23 F.Supp. 2d 741 at 753 (1998), citing *Hampton v. Paramount Pictures Corp.*, 279 F.2d 100 (9th Cir. 1960), *cert. denied* 364 U.S. 882 (1960).

aspects of lock-in fulfil the latter part of the fourth element; but the defendant would probably find it difficult to convince the court that the publisher's representations caused him to believe he could use the software freely despite the overt anti-piracy policy and the copyright notice, so the third element and the first part of the fourth are probably missing.

But there is a stronger reason for denying defences such as abandonment or estoppel than those stemming from the specific requirements of existing common law rules; after all, those defences are equitable in nature and therefore potentially malleable if new circumstances (such as the existence of network effects) are present. The stronger reason is that piracy does not harm (and even benefits) the software publisher, and thus is compatible with the incentives that copyright law seeks to create, only as long as it is limited and enough paying customers remain. Piracy may be 'good' just as long as there is not too much of it. This poses a problem for a judicial system when it wishes to take account of the benefits of piracy, one that stems from the need for consistency, the need to treat similar cases alike and to reach similar results on the basis of similar facts. If it is established that an unauthorized user is shielded from liability because piracy is beneficial and the publisher actually sought to promote it, the same rule should apply to all users, unless there is a way to distinguish between benign and malignant pirates. Apparently there is no basis to distinguish upon. It is the bigger network, composed of all users, that, at a certain level of piracy, creates the optimal result; it is not specific pirates who create the benefit. Likewise, when the level of piracy exceeds the optimum, there are no specific pirates who can be identified as the ones that specifically cause the harm. So, if we cannot distinguish between infringing users, a court must either apply the defence in all cases or reject it in all cases. Accepting the defence would prevent the publisher from controlling the level of piracy and might force him to technically protect the software, causing all the parties involved to lose, so a total rejection of the defence seems to be preferable.

b Fair use

The fair use defence is a long established and important defence against the consequences of infringement, the content of which is determined according to a series of factors such as the purpose or character of use, the nature of the copyrighted work, the amount and substitutability of the portion used, and the effect on potential markets for copyrighted work.¹⁵² The relative importance of each of these factors is determined on a case-by-case basis. The doctrine is too complex to be explored here, so I will only sketch how the theory of this article can be used as a basis for a fair use claim.

152 17 U.S.C. § 107.

One basis for fair use, at least from an economic standpoint, is the existence of high transaction costs, whereby the copyright holder and the user would clearly benefit from licensing but the costs of negotiation are too high relative to the benefits of a voluntary exchange.¹⁵³ Suppose that a user needs to use the software only occasionally. For example, a grandmother wishes to be able to read word-processed letters occasionally sent to her electronically by her grandson, but the retail price of a legal copy is too high relative to the benefit of using the software. Ideally, the publisher and the grandmother could agree on differential pricing and the grandmother could purchase a legal copy for just a few dollars, but the cost of transaction might be too high to allow such exchange. Preventing the grandmother from using the software would not benefit the software publisher because it would not force her to pay the retail price and she would be excluded from the market; furthermore, such exclusion would harm the publisher and other users (such as the grandson) because the network would be smaller and less valuable. Allowing fair use in such a case and in all other cases where the retail price is higher than the reservation price of some users seems like a Pareto optimal solution. As a matter of fact, it has the same effect as tolerated piracy, but without stigmatizing those users as ‘pirates’ or ‘thieves.’ Furthermore, because such fair use is imposed upon the publisher there is a smaller risk that it could cannibalize his high-priced legitimate sales,¹⁵⁴ in the same manner that some statutory exemptions (*e.g.*, reproduction by libraries and archives or performance in an educational institution¹⁵⁵) probably do not affect the publisher’s ability to charge non-exempted users the full price.

The problem with the adoption of the fair use doctrine in such cases is that in order to apply it, a court would need to assess whether the value that a user derives from the software, relative to her financial means, makes the software affordable to her or not. Apart from the fact that this resembles a welfare-agency process, one that courts are not necessarily best suited to perform, the cost that the user would have to bear in order to establish the defence might be higher than the price of a copy of the software, and, in any event, infringement suits against such users are probably a rare occurrence. One might consider a statutory exemption instead, but this would require accurately defining the group of users that would be entitled to fair use. Since my analysis only applies to certain market conditions, however, defining them in legislation is probably too burdensome. A possible alternative is to establish a regulatory agency that

153 See, *e.g.*, William M. Landes & Richard A. Posner, ‘An Economic Analysis of Copyright Law’ (1989) 18 *J.Legal Stud.* 325.

154 See the previous discussion on the signalling effects of price discrimination at Part III.C, above.

155 U.S.C. §§ 108, 110.

will decide on exemptions for groups of users according to the particularities of every market, but this, too, seems rather complex.¹⁵⁶ It follows that despite the theoretical justification for the fair use defence, the administrability of such a defence is highly questionable; the *status quo* created by market incentives, in which software is not protected but, in practice, the law is not enforced against users with low reservation price, seems to be optimal.

c Copyright misuse

Another defence that might be considered is the copyright misuse defence. This common law defence derives from the equitable doctrine of ‘unclean hands’; when it is successful, the court bars immediate relief from the ‘guilty’ plaintiff until the copyright owner has purged his misuse.¹⁵⁷ One basis for the copyright misuse defence is the copyright holder’s engagement in anti-trust violation. When the copyright is practised in a manner that violates the anti-trust laws, it is misused, and a court may bar its enforcement. Since the prospects that a failure to protect software will give rise to anti-trust violations are slim, there are no real prospects for an anti-trust-based misuse claim. There is, however, disagreement among courts and scholars as to whether copyright misuse is limited to anti-trust violations or whether there are other, non-anti-trust, public-policy grounds for misuse. For the non-anti-trust, public-policy-based misuse theory to apply, ‘[t]he question is ... whether the copyright is being used in a manner violative of the public policy embodied in the grant of a copyright.’¹⁵⁸ The argument might go that because, in effect, piracy generates higher profits, strictly enforcing the copyright is not necessary to create the incentives that underlie copyright law, so enforcing it merely enables the copyright holder to earn extra profits by holding up users, and such a practice is unrelated and, indeed, alien to the public policy embodied in copyright law. This argument suffers from the same problems that characterized previous defences, namely that piracy benefits the copyright holder only as long as it can be controlled and that the copyright holder should be able to sue in order to control it. Additionally, it creates a vicious cycle: the inequitable conduct is the enforcement of the copyright against the locked-in user, so in order to enforce copyright the copyright holder must purge this conduct, that is, fail to enforce it.

156 But see Peter S. Menell, ‘Envisioning Copyright Law’s Digital Future’ (2003) 46 N.Y.L.Sch.L.Rev. 63 (predicting an increased role for administrative regulation in resolving conflicting interests in the area of copyright in the digital age).

157 See Brett Frischmann & Dan Moylan, ‘The Evolving Common Law Doctrine of Copyright Misuse: A Unified Theory and Its Application to Software’ (2000) 15 Berkeley Tech.L.J. 865.

158 *Lasercomb Am. v. Reynolds*, 911 F.2d 970 at 978 (4th Cir. 1990).

2 Damages

A prevailing plaintiff is entitled to actual damages, defendant's profits, or statutory damages.¹⁵⁹ In order to be awarded actual damages, a plaintiff is required to prove and quantify his actual injury. If it turns out that he has gained rather than suffered from the infringement, there should be no place to award him damages. Nonetheless, in this event a plaintiff might still elect to recover statutory damages instead of actual damages, avoiding the burden of proving his injury.¹⁶⁰ The award of statutory damages is not automatic, however, as the court must still determine their amount and exercise its discretion; but this discretion is confined to prescribed minimum and maximum limits. The existence of a minimum limit of statutory damages suggests that once infringement is proved and the plaintiff elects to recover statutory damages, the court may be abusing its discretion if it declines their award on the basis that the plaintiff suffered no damage at all. It seems that by creating a minimum level of statutory damages the statute presumes that at least a minimal injury at the statutory level was suffered. It may yet remain an open question whether a defendant is able to rebut such a presumption by proving that instead of injury there is an actual benefit, since awarding damages when the plaintiff has actually benefited seems antithetical to the very notion of compensation.

Although it may sound appealing, or even necessary, to consider the benefits from piracy when damages are sought and deny them if it is possible to establish that the plaintiff actually gained rather than lost from piracy, the constraints of the judicial process render such a move highly inapplicable in any particular suit. This is because copyright infringement suits, by their nature, focus on the relationships and balance of harms and benefits that exist between the copyright holder and the specific defendant, while network effects, which are the source of the benefit, primarily occur somewhere else. Because the greater network value and additional profit are the cumulative result of all the positive externalities that every user confers upon the others, it is impossible to establish a causal connection between the acts of any specific infringer and the overall outcome in the market. Furthermore, while the aggregate value that all pirates add to the network might be significant and might exceed the magnitude of lost direct sales, the marginal value added by any individual defendant may be small and it will be extremely difficult, if not impossible, for such a defendant to demonstrate that his acts caused more benefit than harm. Additionally, because piracy creates a greater

159 See, e.g., 17 U.S.C. § 504. Defendant profits are probably as less relevant in the case of a suit against a user of an infringing copy who does not derive his profit directly from it as they are in a suit against a distributor of infringing copies.

160 Nimmer & Nimmer, *Nimmer on Copyright*, supra note 149 at § 14.04[A].

network value and contributes to increased profits only to the extent that piracy is limited and there are other customers who pay, it would seem rather difficult to determine whether the particular defendant's unauthorized use has been within the optimal level of piracy, and represents a gain, or whether he is an 'excessive' pirate who creates a loss.

In any event, since the software publisher is entitled to sell copies, the unpaid price by the unauthorized user is a loss and may well serve as an adequate measure for the award of damages, provided that the defendant would have purchased the software rather than being forced out of the market if he had to pay for it. In the latter case, the price that the user would have been objectively willing to pay is the actual injury to the publisher. Theoretically, this amount may be discounted by the benefit (the added network value) that piracy created. In the case of an average user, the amount of such benefit is probably marginal and negligible, but it can be significant in a case of a very large organization whose use of the particular software – as a result of its relative size in the market – contributes a significant portion of the value of the network.

All of this suggests that there are practical difficulties in applying network effects to the calculation of damages, but as a matter of practice it might not be too important, since the issue of damages may not be very important in our case. In the context of the use of pirated copies of software in a network setting, both parties, plaintiff and defendant alike, have a clear and strong interest in keeping the user in the network and settling their disputes in the form of a forward-looking agreement.¹⁶¹ Such an agreement can be reached before the suit is filed, in the course of the trial, or after the court has rendered its judgment. In every such settlement, however, there is a cap on the total sum that a user would be willing to pay for the right to continue using the software – his reservation price. So, as long as the copyright holder is entitled to prevent the user from continuing to use the software unless he agrees to pay for a licence, the terms of the settlement (regardless of whether it is categorized in the settlement as damages, licence fees, or a combination of the two) will be a function of the user's reservation price, the expected damages, and their relative magnitude. It follows, therefore, that the important determinant is most probably the issue of future use, that is, the issue of injunctions. Of course, a credible threat of a judgment ordering a payment of extremely high actual or statutory damages unless

161 This is not the case in all copyright infringement suits, although it is not limited to network markets. For example, if A wrote a book and B publishes it without authorization in the same geographic market, B's competing book undermines the profitability of A and it is in A's interest to stop B and gain control on the copies that B has already printed. However, if B publishes the book in a different geographic market, in which A had no intention or no capability of publishing, licensing could be the best solution for both parties.

the user agrees to pay high licence fees can be as effective as a threat of injunction, even in the absence of the latter. Therefore, the following discussion on injunctions can be equally applicable to the exercise of judicial discretion in the case of damages.

3 Injunctions

Injunctions – temporary and final – that a court may issue to prevent or restrain copyright infringement are major remedies for infringement.¹⁶² When the copyright holder is interested in licensing, injunctions are a powerful tool if the infringer faces high switching costs. The higher those switching costs are, the higher the price the infringer will be ready to pay in exchange for a licence. This effect makes temporary injunctions an even more powerful tool because, when issued, these costs are imposed immediately, even before the case is adjudicated. Accordingly, temporary injunctions tend to bring the litigation to a settled solution in many intellectual property disputes.¹⁶³ As I noted earlier, in a network setting, switching away from the dominant supplier is even more costly because in addition to the cost of lost compatibility with one's own old files and the cost of buying and assimilating an alternative software, the switching user must bear the cost of losing the benefits of compatibility with the dominant network. Consequently, in a network setting the effect of injunctions is intensified.

a Preliminary injunctions

The grant of a preliminary injunction is discretionary, and in order to prevail the moving party must show 'either a likelihood of success on the merits and the possibility of irreparable injury, or that serious questions

¹⁶² See, *e.g.*, 17 U.S.C. § 502.

¹⁶³ See Samuel K. Lu, 'The Fundamentals of Preliminary Injunctions, Permanent Injunctions, and Temporary Restraining Orders in Patent Cases' (1999) 572 *Practicing Law Institute: Patents, Copyrights, Trademarks, and Literary Property Course Handbook Series 169* at 171 ('Injunctive relief is also one of the most potent weapons in a patent owner's litigation arsenal. The issuance of an injunction in the early stages of a lawsuit will sometimes effectively end a case, either driving the accused infringer to the bargaining table, eager to settle, or convincing the accused infringer to leave the market altogether.');

see also D. Peter Harvey, 'Seven Strategies for Highly Effective Trademark Injunction Motions' (2001) 677 *Practicing Law Institute: Patents, Copyrights, Trademarks, and Literary Property Course Handbook Series 169* at 171 ('In trademark infringement litigation, motion practice surrounding plaintiff's application for a preliminary injunction is often the entire case. The judge's ruling on the motion for a preliminary injunction is generally (although admittedly not always) a good indication to the parties of where the case will come out, and frequently the case will settle after the motion is decided.');

see generally Jean O. Lanjouw & Joshua Lerner, 'Tilting the Table? The Use of Preliminary Injunctions' (2001) 44 *J.L. & Econ.* 573.

going to the merits [are] raised and the balance of hardships tips sharply in its favor.¹⁶⁴ Some courts follow a four-factor test:

(1) whether the plaintiff will have an adequate remedy at law or will be irreparably harmed if the injunction does not issue; (2) whether the threatened injury to the plaintiff outweighs the threatened harm the injunction may inflict on the defendant; (3) whether the plaintiff has at least a reasonable likelihood of success on the merits; and (4) whether the granting of a preliminary injunction will disserve the public interest.¹⁶⁵

Since the prevailing view is that showing a *prima facie* case of infringement or a reasonable likelihood of success on the merits raises a presumption of irreparable harm, the tests collapse to a simple inquiry into the likelihood of success on the merits;¹⁶⁶ and, in practice, the issuance of preliminary injunctions is quite ordinary, even commonplace.¹⁶⁷

b Permanent injunctions

A prevailing plaintiff in a copyright infringement suit may obtain, in addition to other remedies, a permanent injunction restraining further infringement. Generally, showing past infringement and a substantial likelihood of future infringement justifies the issuance of a permanent injunction.¹⁶⁸ This is not surprising. Given the proprietary nature of copyright, a remedy of permanent injunction is almost axiomatic: if the copyright holder cannot exclude others from copying his work but can only seek damages, to a large extent the rule changes from a property rule into a liability rule. In such a case, in order to copy the work the user is no longer required to buy the right from the copyright holder in a voluntary transaction in which the value of the right is agreed upon by the seller but, rather, can freely copy it as long as he pays a fee, ultimately determined by the court.¹⁶⁹ Despite the generally proprietary nature of copyright, there are situations in which a court would rightly deny a permanent injunction even though infringement has been established.

164 *Johnson Controls v. Phoenix Control Systems*, 886 F.2d 1173 at 1174 (9th Cir. 1989); see also Nimmer & Nimmer, *Nimmer on Copyright*, supra note 149 at § 14.06[A].

165 *Atari, Inc. v. North American Philips Consumer Electronics Corp.*, 672 F.2d 607 at 613 (7th Cir.), cert. denied, 459 U.S. 880 (1982); see also Nimmer & Nimmer, *Nimmer on Copyright*, supra note 149 at § 14.06[A].

166 See Nimmer & Nimmer, *Nimmer on Copyright*, supra note 149 at § 14.06[A]; see also Mark A. Lemley & Eugene Volokh, 'Freedom of Speech and Injunctions in Intellectual Property Cases' (1998) 48 *Duke L.J.* 147 at 159.

167 Nimmer & Nimmer, *ibid.* at § 14.06[A].

168 *Ibid.* at § 14.06[B].

169 For a definition of the different types of rules see Guido Calabresi & A. Douglas Melamed, 'Property Rules, Liability Rules, and Inalienability: One View of the Cathedral' (1972) 85 *Harv.L.Rev.* 1089 at 1092.

Some commentators have suggested that when great public injury would result from an injunction,¹⁷⁰ or when the purposes of copyright law are not optimally served by an injunction,¹⁷¹ a court could award damages or a continuing royalty. It seems that the US Supreme Court has also endorsed this position in two recent cases, basing it on the discretionary nature of a court's decision as to whether to issue an injunction or not.¹⁷²

4 Denying an injunction to relieve hold-up

Despite some potential anti-trust concerns and some efficiency concerns, it seems that the main concern is the strategic use of remedies available under copyright law in order to hold up users and receive *ex post* greater payments than those the publisher would have received *ex ante* had a licence been properly obtained. Courts have generally favoured the issuance of injunctions and rejected suggestions to consider the dire consequences for the infringer on the grounds that taking these into account and denying an injunction would allow a knowing infringer to construct his business around infringement,¹⁷³ which would contradict the statutory scheme of granting an exclusive right.¹⁷⁴ Viewed from this perspective, the anticipated result of paying more *ex post* infringement deters potential infringers and encourages them to negotiate *ex ante*. This argument could be refuted in a case like ours where it is the conscious

170 Nimmer & Nimmer, *Nimmer on Copyright*, supra note 149 at § 14.06[B].

171 See Pierre N. Leval, 'Toward a Fair Use Standard' (1990) 103 Harv.L.Rev. 1105.

172 See *New York Times Co. v. Tasini*, 533 U.S. 483 at 505 (2001) [*Tasini*] (finding that publishers and owners of electronic databases infringed the copyrights of freelance writers when they made the articles, previously published in periodicals, available on such databases, but explaining that it does not follow from that ruling that injunction should follow. The Court suggested that 'the parties (Authors and Publishers) may enter into an agreement allowing continued electronic reproduction of the Authors' works; they, and if necessary the courts and Congress, may draw on numerous models for distributing copyrighted works and remunerating authors for their distribution.' The Court relied on its previous decision in *Campbell v. Acuff-Rose Music*, 510 U.S. 569 at 578 n. 10 (1994), in which it suggested that even if the use of copyrighted material in a parody exceeds the limits of fair use, injunction may not necessarily be the preferred remedy).

173 See, e.g., *Apple Computer v. Franklin Computer Corp.*, 714 F.2d 1240 at 1255 (3rd Cir. 1983), cert. dismissed, 464 U.S. 1033 (1984). The facts of the case are quite ironic in retrospect. Apple, at the time, was a computer industry leader with its Apple II computer. One of the by-products of Apple's success was the independent development by third parties of numerous computer programs designed to run on the Apple II computer. Franklin, wanting to ride on that wave of success, designed an 'Apple-compatible' computer and copied Apple's operating system. Apple sued and prevailed. It is apparent that Apple did not license its operating system to Franklin, and one can only speculate what the shape of the PC market would have looked like had Apple endorsed the manufacture of compatibles and licensed them its software.

174 Ibid. at 1254.

decision and the desired outcome of the copyright holder that many users will construct their business around infringement. In such a case, the hardships for the infringer – presumably in the form of ultimately paying much higher licence fees – can be properly relevant in the eyes of a court. Denying an injunction does not mean a continuing infringement; rather, it means a continuing use subject to the payment of ‘reasonable’ royalties, the level of which would be determined, in the absence of agreement, by the court. Of course, a precondition for such a solution is willingness on the part of the user to pay *a* fee – either one that the parties agree on or one to be determined by the court – rather than *the* fee that the publisher asks. If the user is unwilling to pay *any* fee, an injunction should nonetheless be issued.

Denying an injunction works to deprive the copyright holder of his powerful tool and alleviates the problem of lock-in and hold-up by creating an incentive for the parties to settle at a lower price. With an injunction, the costs that the copyright holder must incur in order to extract the full value from the user are relatively low and the gains are high.¹⁷⁵ For the user, the costs of being enjoined from using the software are extremely high, and she would be willing to sacrifice almost her entire value of the software in order to avoid them. Without an injunction, the copyright holder cannot force the user to pay him his full value. He knows that if he does not settle, it will be costly and lengthy to convince the court that the high price he demands is indeed ‘reasonable.’ He further knows that if the court actually issues a reasoned ruling on the issue of price, it may then be used as a yardstick in other cases. The user knows that although she may ultimately not be enjoined from using the software, she will have to work hard to convince the court that the low price that *she* offers to pay is the reasonable price. Therefore, both parties may elect to agree on an intermediate price and avoid the costs of litigation and precedent.

This solution alleviates the problem of hold-up without undermining the general benefits that tolerated piracy confers upon all parties concerned. Although it ultimately decreases the revenues of the software publisher, he is still compensated, and it seems unlikely that his marginal loss will severely affect his incentives to innovate. Neither should it be a concern that this solution would encourage many potential legitimate users to opt for piracy instead of obtaining a licence, with the expectation that they will end up paying less than the price they could have agreed upon *ex ante*. The costs of such litigation and the uncertainty of the

175 Especially if the copyright holder has successfully obtained a preliminary injunction, and assuming that there are no major factual disputes or additional complex doctrinal questions. In most cases where users install unauthorized copies of software, such an assumption seems reasonable.

results maintain the superiority of obtaining a licence and setting its conditions prior to use as the best – although not complete – protection against hold-up. Such a solution also decreases the need for excessive spending on software management, although it may raise the potential costs of litigation in a case where the parties cannot reach an agreement and the court must determine licensing fees.

This last issue points to another possible objection to this proposed solution, namely the problem of the determination of fees by the court. Courts are generally considered institutionally handicapped in determining prices. They have no advantage over the parties with respect to any relevant factor of pricing. This is even truer in the context of the licensing of software, where the cost of producing copies and licensing them is virtually zero and cannot serve as any meaningful basis for determining the price. This concern would have been significant if courts were indeed required to adjudicate the price in a significant number of cases, but this should not ensue. The proposed solution only designates the courts as the ultimate arbiter of price; it does not follow that the court would actually conduct hearings and issue reasoned decisions about pricing in every dispute. Instead, the court creates a mechanism for the parties to reach an agreement, but one that would be less reflective of the hold-up power of the copyright holder and would therefore more accurately resemble the *ex ante* hypothetically agreed upon price.¹⁷⁶

Although the proposed solution transforms the copyright from a right protected by a property rule to one protected by a liability rule, it is not as alien a legal creature as it may seem. Similar solutions in the area of copyright and other types of intellectual property are often used to solve problems of hold-up and to mitigate monopoly power.¹⁷⁷ Nimmer and Nimmer, for example, cite several cases in which injunctions were denied on the basis that their grant would cause excessive harm to the defendant, a great public injury, or injury to third parties.¹⁷⁸ Many of these cases involve buildings under construction, a classic example for potential hold-up. The recent decision of the US Supreme Court in *Tasini*, in which the Court endorsed such an approach, could also be analysed as a solution for a potential hold-up problem.¹⁷⁹

176 Such an assumption is similar to the assumption that the existence of courts that adjudicate contractual disputes reduces the risk that power will be the sole basis for allocation of entitlements and thus encourages parties to set contracts and comply with their terms without frequent recourse to the courts.

177 See generally Robert P. Merges, 'Contracting into Liability Rules: Intellectual Property Rights and Collective Rights Organizations' (1996) 84 Cal.L.Rev. 1293 ['Contracting into Liability'].

178 Nimmer & Nimmer, *Nimmer on Copyright*, supra note 149 at § 14.06 [B].

179 *Tasini*, supra note 172. The Court's conclusion that subsequent inclusion of freelance writers' articles in electronic databases infringes the authors' copyrights gave the

Limitations on the use of injunctive relief in the case of the collective administration of copyrights are another important example. In the United States, for example, the American Society of Composers, Authors, and Publishers (ASCAP), whose conduct is governed by a consent decree following anti-trust proceedings, cannot enjoin an establishment from publicly performing music if a dispute concerning the rate of the licence fees arises. Under the terms of the consent decree, in case of such a dispute either party may ask the court to determine the reasonable fee, with ASCAP having the burden of proof to establish the reasonableness of its required fees. Pending the completion of any such negotiations or proceedings, the music user has the right to perform any, some, or all of the works in the ASCAP repertory, subject to a possible determination of an interim fee by the court.¹⁸⁰ The consent decree also contains provisions that deal with problems of hold-up that may arise in certain cases.¹⁸¹ A mechanism of determining such licence fees by a tribunal, while limiting the ability to issue injunctions against users, is accepted in many other countries as well.¹⁸²

The recent anti-trust treatment of patent pools provides another example. Since 1997 the US Department of Justice has issued a series of business review letters approving the establishment of several patent pools that would jointly license certain technologies, such as the MPEG-LA

incumbent writers a potential power to hold up the publishers and the database owners because investments had already been made without securing their prior authorization. The problem might be less important in the future, since after the *Tasini* decision publishers will probably secure the right to publish articles in databases in advance.

180 *United States v. American Society of Composers, Authors, and Publishers*, No. 41-1395 (WCC), 2001 WL 1589999 at *5 (S.D.N.Y. 11 June 2001). This consent decree is the last in a series of previous consent decrees and amends them.

181 For example, pursuant to art. IV(F), ASCAP is enjoined and restrained from asserting or exercising any right or power to restrict from public performance by any licensee of ASCAP any work in order to exact additional consideration for the performance thereof.

182 For a description and analysis of collective administration of copyrights see, *e.g.*, Stanley M. Besen, Sheila N. Kirby, & Steven C. Salop, 'An Economic Analysis of Copyright Collectives' (1992) 78 Va.L.Rev. 383; but see Merges, 'Contracting into Liability,' *supra* note 177 at 1340 (dismissing the importance of the availability of a rate court under the ASCAP consent decree). Merges argues that until 1981, the assigned rate court judge was never called on to resolve a fee-setting dispute and that, as in the past, all fees were established by negotiation. This is an underestimation of the importance of the ASCAP consent decree. Bargaining apparently is different under a rule that says, 'you'll pay us what we require or we'll issue an injunction against you' than under a rule that says, 'you must give me a licence, and if we're unable to agree on the price, a court will decide.' Merges also seems to err with regard to the facts. The rate court was called on to resolve fee-setting disputes several times, and description of such proceedings can be found in *Buffalo Broadcasting v. ASCAP*, 774 F.2d 917 at 923 (1984); see also *U.S. v. ASCAP*, 1995 WL 491047 (S.D.N.Y. 1995) (discussing a motion to consolidate forty-eight pending rate-court proceedings both for discovery and for trial).

pool, dealing with video compression, or the DVD pool, dealing with DVDs and DVD players.¹⁸³ These business review letters and the conditions contained therein provide a template for patent pooling arrangements that should be compatible with anti-trust principles.¹⁸⁴ Some of the conditions contained in these arrangements mitigate concerns similar to ours. Anticipating the possibility that these technologies will become *the* standard in their respective industries, the MPEG-LA agreement requires the parties to grant a licence to each and every potential licensee who requests a licence without discriminating among potential licensees. A commitment to grant a licence to each and every potential licensee on a non-discriminatory basis assures that potential licensees will not be forced out of the network or deprived of its benefit¹⁸⁵ – or, alternatively, that by using a threat to exclude them from the network it will be possible to force them to pay higher royalties.¹⁸⁶ This last point is reinforced by a ‘most-favoured-nation’ clause.¹⁸⁷ Another condition, that the licensors will license all their ‘essential’ patents, addresses the potential problem that a patent holder will hold up licensees by invoking patent rights that were not licensed as part of the pool against a licensee who has already committed himself to the particular technology and cannot do without it.¹⁸⁸

183 See Letter from Joel I. Klein to Garrad R. Beeney (26 June 1997), online: US Department of Justice <<http://www.usdoj.gov/atr/public/busreview/1170.htm>>; Letter from Joel I. Klein to Garrad R. Beeney (16 December 1998), online: US Department of Justice <<http://www.usdoj.gov/atr/public/busreview/2121.htm>>; Letter from Joel I. Klein to Carey R. Ramos (10 June 1999), online: US Department of Justice <<http://www.usdoj.gov/atr/public/busreview/2485.htm>>.

184 See Richard J. Gilbert, ‘Patent Pools: 100 Years of Law and Economics Solitude (preliminary draft)’ (Paper presented at a conference at the Faculty of Law, University of Toronto, May 2002), online: Innovation Law <http://innovationlaw.org/pages/patent_pools.doc>.

185 Admittedly, unless royalties are zero, which they are not, some potential licensees would be forced out of the market, so the commitment only assures that there will be other licensees apart from the pool members themselves and that the latter will not collectively and exclusively monopolize the markets.

186 Although, unlike the ASCAP consent decree, the business review letters contain no established mechanism to enforce that commitment.

187 The business review letters do not specify the non-discrimination requirement, so it is not clear whether the parties are obliged to charge a uniform price or whether they are allowed to engage in third-degree price discrimination. The ASCAP consent decree explicitly requires this type of price discrimination when it requires setting reasonable fees but forbids discriminating between similarly situated licensees (because what is reasonable for one industry may be totally unreasonable for another). There seems to be some inconsistency between the requirement not to discriminate within the same class and the conditions that encourage ASCAP to reach an agreement with every user with respect to his individual fees and the designation of the court to set the price in the case of disagreement.

188 A similar practice caused the US Federal Telecommunications Commission (FTC) to initiate proceeding against Dell. The allegations were that Dell, which had participated

V *Summary and conclusions*

This article has described how software piracy can actually contribute to a software publisher's profits instead of decreasing them. The source of this atypical phenomenon are network effects that make the relevant software more valuable, and hence potentially more profitable, as the number of people who use it increases. If the software publisher is capable of discriminating among different users and can cause users with high value to pay more and users with low value to pay less, she can maximize the size and value of her software network and increase her profits. In practice, such price discrimination is prevalent. Software publishers sometimes offer different versions of the software at different prices; sometimes they sell identical software to different classes of users at different prices; sometimes they discriminate over time, offering low introductory prices in the beginning and higher prices later as the software becomes more valuable; and sometimes they adopt any or all of these methods, as well as others. When rates of piracy can be controlled, piracy can be used as just another method to increase the size of the network and the ensuing profits by allowing users with low reservation prices to use the software *de facto* free of charge.

On its face, this theory stands in sharp contrast to the grave cries of the software industry about the dire consequences of piracy, and this contrast raises two related questions: first, if piracy actually benefits the industry, why does the industry spend so much on publicized efforts to eliminate it? and, second, would not it be wiser for software publishers to employ explicit and more institutionalized price discrimination and achieve similar wide distribution without the costs of anti-piracy campaigns? The article has analysed several factors that make piracy preferable to explicit price discrimination. The primary factor is the way in which piracy and the campaigns against it affect users' preferences and their willingness to pay. Anti-piracy campaigns raise the cost of piracy by making it morally less acceptable and legally riskier, thus decreasing gains from piracy and increasing users' willingness to pay for legitimate software. Explicit price discrimination may have the opposite effect: the existence of legitimate users who are able to obtain a legal copy for a much lower price may cause some high-value users to believe that they are being charged excessively and unfairly and encourage them to seek opportunities for arbitrage or even to change their moral perceptions or

in the setting of a standard and declared that the adoption of the standard would not infringe any of its intellectual property rights, invoked a patent right after the standard had been widely adopted by the industry. Dell and the FTC ultimately entered into a consent decree forbidding Dell from asserting the relevant intellectual property rights. See *In re Dell Computer Corp.*, Docket No. C-3658 Decision, 20 May 1996, 121 F.T.C. 616.

risk aversion and pirate the software instead of buying it. It may also signal to competitors and governments that there are significant economic profits to be shared or that the publisher is a monopolist that should somehow be regulated. Tolerating piracy, while on its face economically equivalent to licensing for free, avoids these possible results by excluding any comparable lower price and helps to convey a message that the software publisher is indeed a victim rather than an exploitive monopolist.

Two other related effects are the way in which way piracy can be used as a kind of predatory pricing aimed at monopolizing markets and deterring potential entrants, and the way in which it can increase revenues over time by exploiting the fact that users get locked in to the software and will ultimately be willing to pay more than the market price when they face the threat or consequences of litigation.

The finding that piracy may actually benefit copyright holders is contrary to conventional wisdom envisaged in copyright law and invites a challenge to existing doctrine. The relationship of the practices described here to the creation, maintenance, and exploitation of market power invites an exploration of the anti-trust implications of the theory. However, the results of such explorations are not as dramatic as one might initially expect. A thorough investigation reveals that, in the network setting, the *status quo* in which piracy is illegal but prevalent, and its rates controlled rather than eliminated, yields a Pareto optimal result or, at least, results close to it. The profits of the software publishers are maximized, while incentives to innovation are maintained; consumers enjoy a bigger and more valuable network with virtually no deadweight loss. This may be a fragile *status quo* that any sweeping legal conclusion could ruin, leading to decreased incentives to innovation, the creation of substantial deadweight loss, or both. It has also been observed that to the extent that the practice of tolerating piracy is predatory, such predatory competition is a characteristic of markets for innovative products with strong network effects. Therefore, no significant implications for copyright or anti-trust laws could be identified.

The Pareto optimality conclusion has two limitations, however. One is a danger of inefficient longer-run lock-in strengthened by piracy, and the other is exploitive behaviour of copyright holders against their locked-in users coupled with dishonest representations about the harms of piracy – a behaviour that may seem unfair or unethical. While the latter concern can be addressed by reducing hold-up power through the denial of injunctions or by exercising discretion in awarding statutory damages and other remedies, the first is probably too ambiguous and complicated to justify action against.

Nevertheless, the theory of this article bears some important wider policy implications as well. Understanding how piracy really works and

what its true implications are is important for any policy maker. Such an understanding can contribute to the debate surrounding the scope and depth of intellectual property protection domestically, as well as in developing countries, which often find themselves on the defensive because of high rates of piracy. Such an understanding can also contribute to making more informed decisions about proposals to strengthen intellectual property protection, impose harsher criminal penalties, or spend more public funds on enforcement. Policy makers should ask themselves whether such proposals are necessary to maintain optimal incentives to the creation and dissemination of innovative software and other intellectual goods or whether their primary effect is to increase copyright holders' bargaining power *vis-à-vis* their customers, without any additional increase in the welfare of society.